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A Call for Transparency in the Food System: Case Studies of State and Federal Genetically Modified Organism (GMO) Labeling Initiatives in the United States

Sara Velardi
shvelard@syr.edu

A CALL FOR TRANSPARENCY IN THE FOOD SYSTEM: CASE STUDIES OF STATE AND FEDERAL GENETICALLY MODIFIED ORGANISM (GMO) LABELING INITIATIVES IN THE UNITED STATES

by

Sara Hendrickson Velardi

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Theresa Selfa, Major Professor
Neil Ringler, Chair, Examining Committee
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S. Scott Shannon, Dean, The Graduate School

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Table of Contents

List of Tables v

List of Figures vi

List of Appendices vii

Abstract viii

Chapter 1: Introduction 1
- **Background** 1
- **Research Problem** 6
- **Contribution of Dissertation** 6
- **Description of Format** 8
- **Methodology and Data Collection** 11
  - *Congressional Testimony Transcripts* 12
  - *Statewide Public Hearing Transcripts* 12
  - *Interviews* 13
- **Overview of the Literature** 15
  - *Framing Analysis and Social Movements* 15
  - *Advocacy Coalition Framework* 17
  - *Food Governance and "New Politics of Food"* 19
- **References** 23

Chapter 2: Framing the Food System: A content analysis of U.S. congressional hearings surrounding the regulation of genetically modified organisms (GMOs) in the food system (2011-2016) 32
- **Abstract** 32
- **Introduction** 32
- **Biotechnology Development and Discourse: An Optimistic Beginning** 37
- **The Rise and Evolution of the Anti-GM Discourse** 40
- **The Influence of Neoliberalism and Scientism in Policy Development** 42
- **Framing in Political Discourse** 45
- **Congressional Testimony and Influence on Public Policy** 49
- **Methods** 51
- **Results** 55
- **Evolution of Frames** 55
  - *112 Congress (2011-2012)* 57
  - *113 and 114 Congresses (2013-2016)* 61
- **Discussion** 64
- **Conclusion** 68
- **References** 72

Chapter 3: Local Frames, Local Success: Case Studies of Genetically Modified Organism (GMO) Labeling Initiatives in the Northeast, US. 84
- **Abstract** 84
- **Introduction** 84
- **Framing and Policy Development** 87
- **GMO Labeling at the State Level** 93
- **Methods** 94
  - *Public Testimony* 94
  - *Interviews* 96

Results **96**
Public Testimony Summary 96
Interview Data Summary 97
Support for Label 97
Consumer Rights 97
GMOs and Human Health Risks 98
GMO Risk of Corporate Power 99
Lack of Independent Scientific Data 101
Opposition to Label 101
Consumers Rights 101
Economic Risks with a Label 103
Differences Between States 104
Discussion **106**
So, What's so Unique about Vermont? 108
The Power of the Local, Small-scale Frame 111
Conclusion **112**
References **115**

Chapter 4: "We're a Feisty Little State": Understanding State-Level Genetically Modified Organism (GMO) Labeling Policy Change with the Advocacy Coalition Framework **124**
Abstract **124**
Introduction **124**
Theoretical Framework **126**
Setting the Stage: GMO Labeling Across the Northeast **130**
Connecticut 130
Maine 131
Massachusetts 132
New York 132
Vermont 133
Methods **135**
Results **136**
Advocacy Coalition Structures in the Policy Subsystem 136
Why should GMOs be labeled? 137
Why should GMOs not be labeled? 141
Political Capacity and Political Opportunity Structures 143
Discussion **150**
Belief Stability among Coalitions 150
Coalition Resources, Political Capacity and Political Opportunity Structures 154
Conclusion **158**
References **161**

Chapter 5: Synthesis of Results and Conclusion **169**
Overview and Corroborated Findings **169**
Concluding Thoughts **176**
References **179**

Curriculum Vitae **205**

List of Tables

Chapter 2
Table 2.1 Congressional hearings in the House of Representatives and Senate related to biotechnology regulation from 2011-2016 54
Table 2.2 Most frequently used frames by GMO proponents and opponents categorized by legislative session 56
Chapter 3
Table 3.1 Distribution of public hearing testimony statements (CT, ME, VT, MA) by affiliation 97
Table 3.2 Number and distribution of interviewees by stance and affiliation 97
Table 3.3 Most frequently cited frames in support of labels in public testimony within and across four states 98
Table 3.4 Most frequently cited frames in opposition to labels in public testimony within and across three states 104
Table 3.5 Select agricultural statistics from USDA Census of Agriculture, states included in study in bold (USDA 2012) 111
Chapter 4
Table 4.1 Evaluation methods for each ACF principle under study 130

List of Figures

Chapter 1
Figure 1.1 Diagram of research case studies and data sources 5
Chapter 2
Figure 2.1 Total number of witnesses and legislators who testified or commented in congressional hearings (2011-2016) related to the regulation of biotechnology by affiliation and organized by general support or opposition to GMOs 55

List of Appendices

Appendix A. Interview Contact Letter 184
Appendix B. Informed Consent for Interviews 185
Appendix C. Complete List of Interviews 186
Appendix D. Interview Protocol 188
Appendix E. Coding scheme and data summary for Congressional hearings 189
Appendix F. Name and affiliation of witnesses invited to testify at Congressional hearings related to the regulation and labeling of biotechnology in the food system 194
Appendix G. Coding scheme and data summary for public statewide hearings 199

Abstract

S.H. Velardi. A Call for Transparency in the Food System: Case Studies of State and Federal Genetically Modified Organism (GMO) Labeling Initiatives in the United States, 210 pages, 8 tables, 2 figures, 2018. APA style used.

Biotechnology in the food system has become a contentious issue in the United States, as citizens, activists and policymakers question the environmental, moral, socio-economic, human health and ethical aspects behind this technology. While U.S. governmental agencies assure the safety of genetically modified organisms (GMOs) included or the practice of genetic engineering (GE) in the food supply, the public has remained wary and skeptical. Social movements for the labeling of GMOs have sprouted across the United States beginning in the early 2010s on the West coast with limited success. However, the Northeast, U.S. has seen a mix of success, failure and stagnation with Connecticut and Maine passing GMO labeling laws partially in 2013 and 2014 respectively and Vermont enacting the first labeling law in 2016 followed almost immediately by the passage of a federal labeling bill one month later. This research project takes a mixed-methods approach relying on public testimony, Congressional witness testimony and interviews with stakeholders involved in the Northeast statewide and federal labeling initiatives to understand how the issue of GMOs and GMO labeling was framed in these policy-making settings and which types of framings led to policy passage. Drawing on and extending sociology of food and standards, science and technology studies, and frame and policy analysis, this doctoral dissertation research project examines the public discourses surrounding the issue of biotechnology in the food system as well as external factors influential in social movement outcomes such as advocacy coalition structures, resource access and political opportunity structures that are influential in the passage of a GMO labeling bill. The majority of frames at both state and federal scales focused on a "consumer right to know", individualism frame that resonated well with the public. Vermont was unique in that the public's and stakeholders' frames focused on sustaining local civic agriculture in the state, which enhanced community solidarity and created a communal identity. Those frames coupled with an accessible citizen legislature, responsive legislators and absence of lobbyists created a favorable political environment for the grassroots labeling coalition's success leading to policy passage.

Key Words: genetically modified organisms, social movements, frame analysis, labeling, advocacy coalition framework

S.H. Velardi
Candidate for the Degree of Doctor of Philosophy, April 2018
Theresa Selfa, Ph.D.
Department of Environmental Studies
State University of New York College of Environmental Science and Forestry,
Syracuse, New York

Chapter 1: Introduction

Background

The role of biotechnology in the food system through the introduction of genetically modified organisms (GMOs) has ignited fierce debate about the moral, environmental and safety issues related to the application of this technology (Thompson 2014; Schurman and Munro 2010). Supporters of GMOs cite farmer and environmental benefits including labor efficiencies (field-wide spraying rather than weed-by-weed efforts) and decreases in pesticide use (Saletan 2015; NAS 2016), as well as social and moral benefits (providing food surpluses for growing human populations and creating nutrient-rich crops for populations suffering from nutrient deficiencies) (Asis 2017; Curchoe 2017). However, critics of GMOs contend that GMOs risk human health, impact the natural environment (i.e. general degradation, biodiversity loss), erode farmer agency, contribute to the loss of traditions in food culture, and further concentrate the role of corporations in the agriculture sector (i.e. further loss of the family farm) (Kaur et al. 2013; Thompson 2014). The general consensus from U.S. governmental agencies (Food and Drug Administration, Department of Agriculture (USDA), Environmental Protection Agency) and scientific bodies (National Academy of Sciences) is that there is no increased harm with the planting or consumption of GMOs (NAS 2016). However, the public remains skeptical. According to a 2016 poll, 93% of Americans believe that the federal government should require GMO labeling and 52% believe GMO foods are unsafe (Langer 2016). Moreover, studies based in Europe have found that increased factual knowledge of the science behind GMOs has little influence on attitudes towards acceptance of the technology (Glaskell et al. 2003; Priest et al.

2003). Clearly more than scientific information affects citizens' perceptions surrounding GMOs and GMO labeling.

In response to the public's critique and wariness with the development and commercialization of GMOs, social movements have been sprouting across the United States to push for moratoriums on the planting and labeling of GMOs. While moratoriums have only achieved success at very small scales (i.e. county level) and for the most part have failed due to legal disputes (Gillam and Doering 2011; Edge 2011), the GMO labeling movements have picked up momentum across the United States with a mix of success, failure and stagnation at the state and federal level. On the federal front, advocacy groups and legislators have attempted to pass a federally mandated labeling bill under a variety of names and with a range of stringency in requirements over the past five years. For example, H.R.913 Genetically Engineered Food Right-to-Know Act was introduced by Representative Peter DeFazio (D-OR) for two sessions of Congress (113th and 114th) but stagnated and did not receive any floor votes (Congress.gov 2016a). In 2015, the House of Representatives passed 114 H.R. 1599 The Safe and Accurate Food Labeling Act of 2015, introduced by U.S. Congressman Mike Pompeo (R-KS), which "establishes a federal labeling standard for foods with genetically modified ingredients, giving sole authority to the Food and Drug Administration to require mandatory labeling on such foods if they are ever found to be unsafe or materially different from foods produced with GM ingredients" (Pompeo 2015). This bill, which some pro-GMO labeling groups had termed the "DARK Act, (Denying Americans the Right to Know)" would have pre-empted any state-mandated GMO labeling bills (such as Vermont's labeling bill that passed in 2016). This bill did not pass in the Senate, remaining under review in the Committee on Agriculture, Nutrition and Forestry (Congress.gov 2016b). On July 14, 2016, Congress passed S.764, The Biotech Labeling

Solutions Act, deemed a compromise GMO labeling bill that requires the labeling of GMOs. The USDA has been granted authority to decide how the information will be displayed, including a label on the package or contained within a QR code that consumers could scan with their mobile devices. Similar to Rep. Pompeo's previous bill, S.764 also preempted state-mandated labeling requirements (Strom 2016). This Act has already been contested by advocacy organizations, industry and governmental agencies that question whether it truly epitomizes consumer rights and demands for clear transparent labeling (Charles 2016).

Before the federal GMO labeling bill passed Congress in July 2016, states had begun to introduce their own statewide GMO labeling bills. However, the only state to pass a GMO labeling bill was Vermont, which went into effect July 1, 2016. Connecticut and Maine had also introduced statewide GMO labeling bills in 2013 and 2014, respectively. However, both of these bills had a "trigger clause" attached, that is, before these labeling bills could go into effect, four other states must enact labeling, one must border said state, and the combined population of all states must total more than 20 million (Wilson 2014). Since Vermont was the only state to pass a bill and its population is less than 1 million, Maine and Connecticut were relying on other more populous states, especially New York and Massachusetts, to move bills forward. Despite strong advocacy from consumer rights groups, environmental organizations and prominent legislators for a label, New York's GMO labeling bill never moved to a floor vote and Massachusetts only had a public hearing on their GMO labeling bill that had yet to culminate in a floor vote as well. This unique situation in the Northeastern U.S. of success, failure, stagnation, and interdependence in labeling bills provide a rich set of case studies to examine the labeling discourse used within and across states. Additionally, these state labeling initiatives, especially the enactment of labeling legislation in Vermont, have influenced the recent passage of the

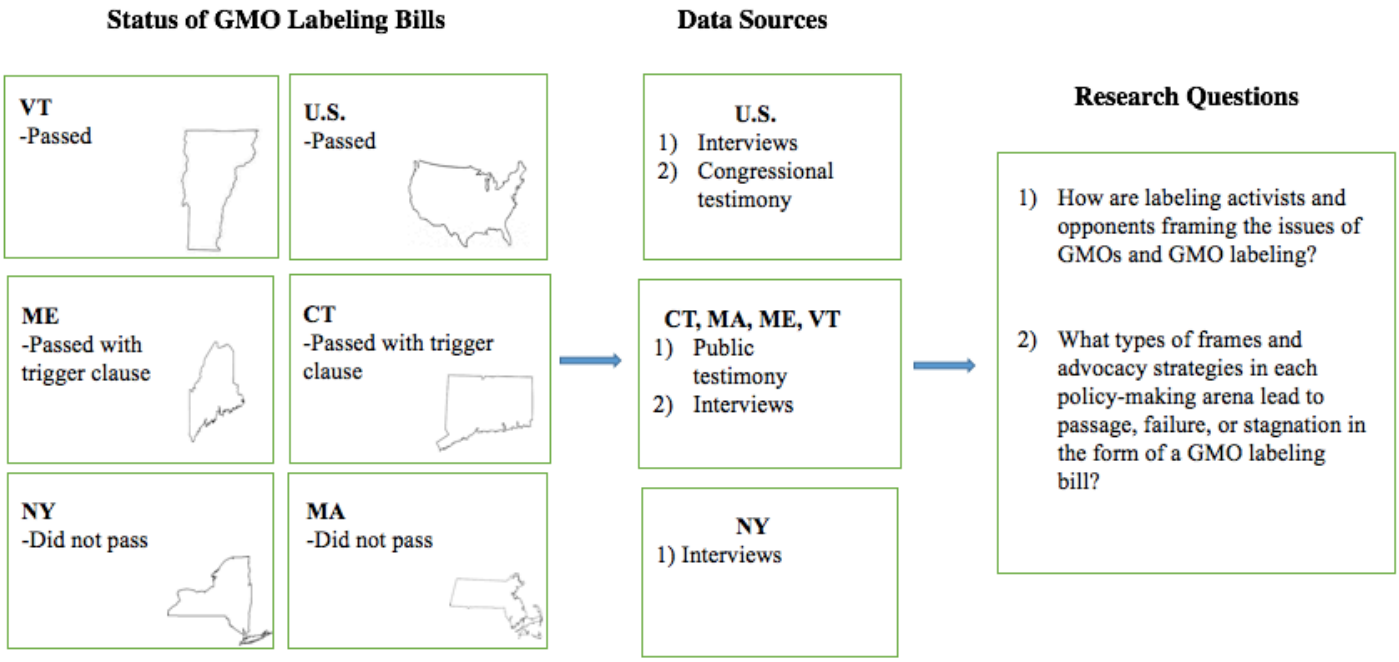
federal GMO labeling bill and the requirements contained within the specific bill. This dissertation project will compare frames and advocacy strategies in each policy-making arena within and between these five states as well as between state and federal scales to ascertain which proved most effective in the passage of a GMO labeling bill.

This project takes a case study approach to look at five statewide GMO labeling initiatives as well as the labeling bill at the federal level (Figure 1). These five Northeastern states were selected to analyze the influential factors in the passage of a GMO labeling law due to the variability in labeling initiative outcomes (success, failure and stagnation). In addition, these cases share the commonality that all five GMO labeling initiatives were conducted as legislative campaigns, unlike states on the West coast, including Washington, California and Oregon, that all held ballot initiatives for GMO labeling. Studying statewide legislative campaigns allows for particular focus on the impacts of advocacy strategies on legislative behavior (Bergan 2009) and to evaluate whether legislators serve as "policy entrepreneurs" in statewide social policy development (Kingdon 2011), whereas in ballot initiatives the role of the legislator is diminished. Furthermore, studying legislative campaigns within a region (such as the Northeast where two out of the five states passed a GMO labeling law with a "trigger clause" making them dependent upon a regional passage of a labeling law), facilitates the evaluation of whether any collaborative frames (Lubitow 2013) were deployed across states to build stronger partnerships and their effect on social movement campaigns.

Case studies allow researchers to look at events in detail in order to make sense of particular phenomena that are bound in time and space (Yin 2014). This collective case study approach (Charmaz 2014) enables us to look at multiple case studies and draw comparable analyses across different states and scales. This research draws on several data sources including:

1) *testimony* from public hearings on the passage of a statewide GMO labeling bill in four states (CT, MA, ME, and VT) in order to understand the way in which the public and different stakeholders (citizens, activist organizations, industry groups and health professionals) frame the risk (or non-risk) of GMOs and the potential solution (or non-solution) of a label; 2) *semi-structured interviews* with prominent stakeholders involved in the labeling debates in each state and at the federal level, including environmental groups, consumer rights organizations, farm organizations, legislators, and industry, focusing on their perceptions of GMOs, labeling and policy implications; and 3) *witness testimony* from Congressional hearings from the 112, 113, and 114 Congress (2011-2016) concerning genetic engineering and labeling to identify which stakeholders played a key role in the formulation of public policy on the federal level as well as how they frame the problem (or non-problem) of GMOs.

Figure 1.1 Diagram of research case studies and data sources



Research Problem

Policy studies research demonstrates that in order for policy change to occur, policy advocates will attempt to recruit the wider public to their cause by deploying certain arguments and frames they believe will resonate with the public (Entman 1993; Chong and Druckman 2007a). The questions that animate this study are: *How are labeling activists and opponents framing the issues of GMOs and GMO labeling? What types of frames and advocacy strategies in each policy-making arena lead to passage, failure or stagnation in the context of a GMO labeling bill?* Drawing on and extending sociology of food and standards, science and technology studies, social movement studies, and frame and policy analysis, this doctoral dissertation research project examines the public discourses surrounding the issue of biotechnology in the food system and external factors such as advocacy coalition structures, resource access and political opportunity structures that are influential in the passage of a GMO labeling bill. I will analyze the discourses used by the public and a wide spectrum of stakeholders involved in these labeling debates, including citizen activist groups, consumer rights organizations, farmer advocacy groups, industry and legislators, and the policy implications of particular discourses and frames.

Contribution of Dissertation

This dissertation research intends to complement the sociology, social movement and policy studies fields by examining discursive influences within social movements and policy development related to agriculture and food production. This dissertation project draws upon frame analysis to identify which frames or rationales stakeholders in the federal or state level labeling initiatives deployed to form their arguments and influence said policies. Frame analysis

within social movements can help to illuminate how stakeholders are framing the issue or nonissue of GMOs, which frames resonate with the public, and how that influences the presence of these issues on the policy agenda. Frames can be defined as "mentally stored clusters of ideas that guide individuals' processing of information" (Entman 1993: 53) and serve as interpretive frameworks that allow people to make sense of a situation (Goffman 1974). The study of frames extends back to the early 1970s where Gregory Bateson (1972) introduced the concept of a frame as a "metacommunicative device that sets parameters for 'what is going on' (Oliver and Johnston 2005). Snow and Benford (1988), who have conducted seminal work on the concept of framing, refer to framing as analyzing "the production of meaning" (198) that moves beyond the "static conceptualization of ideology" (197) and "specify the interactive processes by which frames are socially constructed, sustained, contested, and altered, the phenomenological and infrastructural constraints on those processes and the consequences of these processes for aspects of mobilization" (2005, 206-207). Analysis of framing is particularly useful and beneficial in analyzing the course of social movements because unlike ideology (which usually will inform the deeply held values and beliefs of individuals involved in social movements), frames are "empirically observable" (Snow and Benford 2005: 210) and available to scholars to observe and examine throughout the course of various debates, conversations, etc.

This dissertation project also contributes to policy studies by utilizing the Advocacy Coalition Framework (ACF) to understand the trajectory of state-level policy initiatives in a comparative analysis of advocacy coalitions formed, underlying policy beliefs that tie these coalitions together and exogenous factors within each state (such as political opportunity structures). The ACF, originally developed by Paul Sabatier in conjunction with Hank Jenkins-Smith in the 1980s, has become one of the most utilized frameworks of the policy process in

policy research (Jenkins-Smith et al. 2014) but has been used sparingly in comparative analyses of policy developments (Leach and Sabatier 2005; Weible et al. 2010). Frame analysis and the ACF can be used in conjunction to identify the narratives that coalition members promote and the beliefs that tie these coalitions together to recruit like-minded members (Jones and McBeth 2010; Shanahan et al. 2011). These advocacy coalitions can find success in their push for a particular policy outcome, leading to policy change and learning based on their strong alignment with policy core beliefs among their members and favorable political opportunities (Sabatier and Jenkins-Smith 1993; Jenkins-Smith and Sabatier 1994; Henry 2011; Thompson et al. 1990). Political opportunities can be defined as channels of access to political decision making, availability of political allies to social movement groups, and the stability of political alignments and institutions (Tarrow 1992). Framing and political structures work together and may influence one another. Framing can influence the political opportunity structures available or a change in political opportunities could morph a framing strategy. This dissertation will investigate the connections between the frames utilized by stakeholders, advocacy coalitions formed, exogenous factors influential in policy development (such as political opportunity structures), and the success or failure of a GMO labeling bill.

Description of Format

This dissertation is comprised of three individual manuscripts, each of which draws upon a specific framework to address the aforementioned major research questions in an attempt to understand the diverse outcomes of GMO labeling policy at the federal and state level.

The first manuscript, titled *Framing the Food System: A Content Analysis of U.S. Congressional Hearings Surrounding the Regulation of Genetically Modified Organisms*

(GMOs) in the Food System (2011-2016) looks at the discourse within federal congressional committee hearings related to GMO regulation and labeling that ultimately led to the passage of a GMO labeling law in 2016. After years of stagnation in federal policy to increase regulation or impose labeling on GMOs, there was a sudden shift in policy with the enactment of the federal mandatory GMO labeling bill in 2016. Past literature on the analysis of biotechnology policy development has found that the legacy of scientism and scientization have prevented broader discussions of the social, economic and moral impacts of biotechnology and helped maintain limited government oversight in the U.S (Binimelis and Myhr 2016; Kinchy et al. 2008; Kleinman and Kinchy 2003a; 2003b). However, the passage of a federal labeling law appears to turn that notion on its head. This manuscript evaluates the discourse within the three congressional sessions leading up to the passage of the GMO labeling law to evaluate who testified, what types of framings were used and if there is a shift in the discourse that now legitimizes social, economic and moral issues within the discussion of biotechnology. Results indicate that there *is* a shift in discourse from the focus on the broad benefits of GMOs and calls for greater regulatory oversight to specific socio-economic benefits and risks of a label. While scientism rhetoric is used continually throughout all three sessions, social and economic concerns related to labeling and GMOs become a greater point of contention within the political debates surrounding GMOs in the food system.

The second manuscript, titled *Local Frames, Local Success: Case Studies of Genetically Modified Organism (GMO) Labeling Initiatives in the Northeast, U.S.* specifically looks at the GMO labeling initiatives at the state level within and across the five states under study (Maine, Massachusetts, New York, Connecticut and Vermont). I combine interviews with stakeholders active in the state initiatives and content analysis of oral testimony from statewide public

hearings to assess the different framings utilized in the debates. In this chapter, I look at the different framings of the risks and benefits of GMOs, perspectives on labels and proposed solutions at a state-level scale, compared to the previous chapter that looked at these framings at the national scale. Analysis of interview transcripts and public witness testimony in the state hearings also allow the opportunity to see which frames resonated with members of the public. Furthermore, with a diversity of GMO labeling policy outcomes at the state level (failure, stagnation and success) I identify connections between different types of framing and success in passage of a labeling law to help identify which frames were deemed most effective in the passage of a GMO labeling law. Overall, across all five states the majority of frames centered around a consumer's right to know and public health risks with GMOs. However, unique in Vermont, activist frames focused on sustaining local agriculture and food production. GMOs were viewed as a threat to Vermont's local food system and the environmental-food ethic Vermont citizens embody. Framings tied to state socio-economic concerns appeared to be an effective framing strategy for the state compared to the other states under study.

The third manuscript, titled *'We're a Feisty Little State': Understanding State-Level Genetically Modified Organism (GMO) Labeling Policy Change with the Advocacy Coalition Framework* utilizes the Advocacy Coalition Framework (ACF) to understand the diversity of policy outcomes across the five Northeastern states under study. While the previous two chapters focused primarily on frame analysis to understand policy development, this chapter focuses on a number of different factors prevalent in the ACF to understand policy change including the creation of advocacy coalitions active in each state, their shared belief systems, a coalition's political capacity (including access to monetary resources, legal authority, public support, political authority, etc.) and each state's political landscape (including political opportunity

structures, external institutions, etc.). The majority of this analysis relies on interviews with stakeholders active in the state labeling initiatives, especially state legislators who gave an in-depth account of the bill's movement through the state legislature. This analysis gave us a comprehensive look at a number of different factors that could influence a policy's success or failure. As explained previously, with a trajectory of outcomes in the Northeast (failure, success, stagnation), one can evaluate and make connections between states with successful advocacy coalitions and favorable political environments that led to policy passage. Vermont's policy core beliefs tied to maintaining local state agricultural food production and a highly accessible citizen legislature created an ideal environment for grassroots policy passage.

The final chapter of this dissertation integrates the findings from individual manuscripts to present the major framings utilized in policy discussions of GMOs at different scales and across states, how these discourses may have affected policy outcomes and reflections on additional influential factors. Avenues for future research are also explored.

Methodology and Data Collection

I employed a mixed-methods collective case study approach combining interviews and analysis of secondary data. Manuscript 1 relied on transcripts of congressional hearings collected via the Government Publishing Office (GPO) website, which is the federal government repository for official information of the U.S. government including publications from Congress and the White House (U.S. GPO 2017). Manuscript 2 data came from semi-structured interviews with stakeholders involved in the state-level GMO labeling initiatives and transcripts from statewide public hearings on GMO labeling. Manuscript 3 primarily relied on interviews with stakeholders and specifically state legislators involved in the state labeling campaigns with some

secondary analysis on stakeholder organizations' materials, such as mission statements and newsletters, published on their websites. All qualitative data was analyzed using the qualitative software program *Atlas.ti*. Below, I provide a detailed explanation of methods used for data collection and the way in which it was operationalized for each manuscript.

Congressional Testimony Transcripts

In order to identify hearings that were related to GMO regulation and labeling between 2012-2016, I initially explored bills that had been introduced into the House of Representatives and the Senate during that time period on the Congress.gov database using the search terms "biotechnology", "genetically engineered" and "genetically modified organism." I noted the committees where these bills were introduced and then cross-referenced the committees with the GPO to find hearings for each of these committees related to biotechnology. While the committee hearings are publicly available via the GPO website, I also searched through Proquest Congressional to find any hearings that may have been unpublished (one hearing included in the analysis was unpublished). Content analysis using *Atlas.ti* was performed on each complete hearing transcript to bring forth emergent themes and ideas (Neuendorf 2001; Liu et al. 2015). After coding was performed, codes were categorized by affiliation of each witness and the specific congress in which he or she testified. The complete coding scheme for the congressional testimony transcripts can be found in Appendix E.

Statewide Public Hearing Transcripts

Statewide public hearings related to the labeling of GMOs were collected for each state under study. Public hearing testimony was accessible for Connecticut and Maine through their

state government websites. Massachusetts' public hearing testimony was requested via their state government office as text. Public hearing testimony for Vermont was requested via the state government's archive office as audio files and then transcribed verbatim. Connecticut and Vermont each had two public hearings on the subject of GMO labels (2012, 2013 and 2012, 2014 respectively), Maine had a hearing in 2013 and Massachusetts in 2015. New York had a hearing on GMO labels in 2013 and the transcript was requested via the state government office. However, after initial reading of the testimony, New York's hearing differed significantly from the other states' hearings in that only 14 witnesses testified and the public was not allowed to testify. Since the main rationale for collecting public testimony data was to evaluate which types of frames *the public* was using in their reasons for support or opposition to a label, New York's testimony was excluded from the analysis. Content analysis was performed on each piece of testimony using *Atlas.ti* and categorized by witness identity (citizen, industry, government legislator, non-governmental organization). The complete coding scheme for the state public hearings can be found in Appendix G.

Interviews

Interviews were conducted with a range of stakeholders involved in the national and state (CT, MA, ME, NY, VT) GMO labeling initiatives including state legislators, representatives of environmental groups, farmer advocacy groups, biotechnology industry, food industry, science advocacy groups and consumer rights organizations. Interviews were conducted over a two-year time span from May 2015 to August 2017. A total of 56 interviews were conducted. Using a modified snowball technique (Weible et al. 2010), interviewees were identified from background material on the state labeling initiatives collected from the internet, media articles and press

releases. An initial email request for an interview was sent to either an organization's contact or an individual person of interest. A copy of the standard contact letter can be found in Appendix A. Some interviewees were identified by their testimony given at previous statewide labeling hearings or suggested by other interviewees as an individual of interest in the labeling initiatives. Consent to participate in an interview was gained prior to the start of each interview. The interview informed consent statement can be found in Appendix B. Interviews were strictly confidential and were assigned an identifier code upon completion of the interview. A complete list of interviewee codes with their affiliation can be found in Appendix C. A standard interview protocol was used for all interviewees with a semi-structured format to allow for follow-up questions to pursue interesting or unexpected responses, which can be found in Appendix D. Questions were slightly altered depending upon the interviewee. For example, when interviewing an individual or state legislator, certain questions from the standard protocol were left out because they did not apply. Overall questions pertained to identifying risks or benefits of GMOs, why they supported or opposed labeling and their perspectives on a federal or state-mandated label. Interviews were conducted in person or by telephone and lasted 30 to 60 minutes in length. All interviews were recorded with permission from participants and transcribed verbatim. Interviews were subject to similar coding methods with *Atlas.ti* as the congressional and statewide public hearings to bring forth emergent themes and ideas and subjected to focused coding to develop discrete codes and categories (Charmaz 2014).

Overview of the Literature

Framing Analysis and Social Movements

Political actors attempt to recruit members of the public by creating messages or narratives that will sway the public to favor a particular policy decision over alternatives (Chong and Druckman 2007a; Baumgartner et al. 2009). Advocates for policy change can encompass a wide variety of stakeholders including advocacy organizations, legislators, environmental groups and interest groups. When political actors believe that a policy change is necessary they may attempt to reframe the issue by trying "to raise the salience of a particular aspect of a problem or of a particular solution to the problem" (Baumgartner et al. 2009: 167). If political actors are able to identify a new or different definition of a problem, this may help to justify a different solution to the problem (Baumgartner and Jones 1993; Baumgartner et al. 2009).

In social movement literature, identifying frames has been a central dynamic to understanding the trajectory and strategy of social movements (Benford and Snow 2000). That is, understanding how people frame issues helps one understand how they mobilize (Feindt and Netherwood 2011). And with a rising number of actors becoming involved in decision-making and policy development (Boston et al. 2003; McGann and Johnson 2006), discourse has become a great influence on the promotion and development of certain policy ideas over others and has blossomed as a vital area of research concern in policy studies (Schmidt 2006; 2010). For many issues, stakeholders will identify multiple frames to explain a problem or highlight a solution. Rahn et al. (2016) found that supporters of raw-milk sale legalization in the U.S. utilized frames such as health benefits, personal freedom, anti-big government regulation and support of local food. Utilizing multiple, integrative frames can provide a multidimensional "package" of frames that can appeal to a wider audience (Baumgartner et al. 2009; Haydu 2012; Mondou et al. 2014).

Past framing literature has attempted to understand the effect of particular frames on the public through experimental design where individuals are subjected to competing frames and participate in a post-experiment survey to observe if opinions changed on the topic (Brewer and Ley 2011; Chong and Druckman, 2007a, 2007b; Fowler and Gollust 2015; Nisbet et al. 2013; Wise and Brewer 2010). However, there are limitations to using these types of experimental designs; for example, measuring framing effects may be limited by a pretreatment effect as people may have already been exposed to certain framing messages (Barabas and Jerit 2010; Gaines et al. 2006). In contrast, being able to examine public testimony from citizens in each state can help determine which frames resonate with the public in their support for or opposition to a GMO label without a researcher pre-determining possible responses found in public opinion surveys or polls (Leyden 1995; Holleman 2012). Furthermore, participants in statewide hearings encompass a distinct sample of concerned citizens and stakeholders who are taking an active role in the movement for or against a GMO labeling bill. By analyzing the testimonies in each state, specific frames utilized can be identified and the effect these frames have on legislative action in support or in opposition to a GMO labeling bill. Recent science communication research has looked at the effect that public health risk framings have on the public's concerns and practices related to climate change, though not on the actual passage or failure of a particular climate change policy (McComas et al. 2015; Myers et al. 2012; Akerlof et al. 2010). The unique case studies in the Northeast enable not only the use of public testimony data to evaluate the effect of particular frames on the public; but additionally the evaluation of the effect of different frames on distinct policy developments across the five states and at the federal level.

Advocacy Coalition Framework

The Advocacy Coalition Framework (ACF) is a prominent theory that analyzes how policy change occurs and highlights the impact that advocacy coalitions comprised of individuals with common core policy beliefs can have on policy change (Jenkins-Smith and Sabatier 1994; Weible and Sabatier 2009) and can help identify key factors that drive policy change in a complex policy-making environment (Breton and De Leeuw 2011). Interaction, negotiation and policy learning within and between coalitions are considered the major driving forces between political processes and policy change (Sabatier and Jenkins-Smith 1999). Therefore, identifying how advocacy coalitions work together can help us understand why and how certain policies are adopted and/or resisted at the state and/or federal level in the U.S. According to Sabatier and Jenkins-Smith (1999), advocacy coalitions can be comprised of governmental and private organizational members who share a three-tiered hierarchal structure of beliefs. The structure contains broad and deep core beliefs (such as the values of liberty, security and equality), followed by policy core beliefs (such as the role of government versus the market in alleviating social ills), and specific secondary beliefs (identification of a problem or solution pertaining to a specific location or context) and attempt to influence behavior in the policy sphere over time. The ACF evaluates beliefs that bind coalitions together to determine a coalition's structure and stability in social movements and policy development. These coalitions (comprised of partnerships between the public and stakeholders) can gain traction in the policy-making arena where otherwise they may have been disenfranchised actors (Daley 2007; Leach et al. 2002). In this research, the ACF will be used to identify the different advocacy coalitions involved in the GMO labeling debates at the state level and the fundamental beliefs that tie these coalitions together, based off of frames utilized to identify the problem (or non-problem if GMOs are not

considered an issue that needs resolving via policy mechanisms) of GMOs and the solution (or non-solution) for labeling. If we can understand how coalitions form based on their beliefs, then we can understand how these coalitions will search for, process and evaluate new information, specifically in the policy-oriented learning process (Ripberger et al. 2014).

The ACF has also been used to analyze differences in resources and strategies among advocacy coalitions. Pierce (2016) found that in comparing the winning and losing coalitions in terms of resources, the winning coalition had more public support but the losing had more financial resources. This differs with Sabatier's and Weible's (2007) earlier study which found that coalitions with greater resource access had the greatest impact in the policy process. Pierce's finding supports Nohrstedt's (2011) finding that certain resources (such as public support) matter more in policy change than others. Increased financial resource access has even been found to be a nonfactor in successful coalitions in some studies (Kubler 2001; Pierce 2016). Others have found that maintaining a strong coalition was found to be an important strategy in policy change (Pierce 2016; Crow 2008; Gupta 2014). Utilizing the ACF in analyzing the GMO labeling initiatives across the five states provides the opportunity to analyze multiple factors that could have had an influence in the final policy outcomes. I will compare the advocacy coalitions within each state, the belief structure tying these coalitions together, resources and strategies as well as the specific political landscape within each of these states, which can further influence the success or failure or certain coalition strategies or resource use. The ACF is a flexible framework that has been used to describe and explain the formation and maintenance of coalitions and policy change (Weible and Nohrstedt 2013). While it has been rarely applied comparatively using similar methods of data collection and analysis (Leach and Sabatier 2005; Weible et al.

2010), this present study offers an approach to conduct comparative analyses using the ACF to inform future studies.

Food Governance and "New Politics of Food"

Food scholars argue that the current period is defined by a "new politics of food" or food governance where collective goals are set and pursued by non-state actors with less influence and control by state and national governments (Busch and Bain 2004; DuPuis 2000; Bestill and Bulkeley 2006; Schweikhardt and Browne 2001). With the rise of neoliberalism, the primacy of the market and rejection of state intervention, new spaces arise for non-state actors (such as civil society and corporations) as well as supranational actors to participate in specific policy arenas (McCarthy 2006; Clapp 2012; Rodrik 2011; Roff 2007). A new role emerges for consumers to influence the production-side of food systems through their "conscientious consumerism" and participation in food politics (Bartley et al. 2015; Murdoch et al. 2000). In order to capture these new consumer-driven markets there has been an increase in private authority driven by non-state actors for quality assurance through the act of labeling (Ponte et al. 2011; Bain et al. 2013; Bartley et al. 2015; Bain and Dandachi 2014). Specifically in GMO labeling, companies began to label their products as Non-GMO voluntarily or through third-party certification (such as the Non-GMO Project Verified), which assess and assign labels to companies based on technical specifications (NGMOP 2016). Prior to passage of Vermont's mandatory labeling law, large food companies such as General Mills, Kelloggs and Campbells had also begun to voluntarily label GMO ingredients (Charles and Aubrey 2016).

For social movement actors, private authority has become an "alternative pathway" to gain power and momentum in an area where political authority has decreased dramatically (Hess

2007). The conscientious consumer now has an influential role in the marketplace and can advocate for environmental and socioeconomic characteristics in the economy's productive sphere, such as Fair Trade certified, organic certification and "green" environmentally friendly products (Kysar 2004; Neilson 2010; Soper 2004; 2007; Micheletti 2003; Bostrom and Klintman 2008). The concept of transparency in company practices also is influential in food politics with normative claims of consumer right-to-know and larger participation and accountability by citizen-consumers (Mol 2015). However, some scholars are wary of the likelihood that labeling and conscientious consumerism can address socioeconomic ills. Maniates (2001) warns that an increase in eco- and social labels could give rise to "individualization of responsibility." Szasz (2007) cites the possible onset of "political anesthesia" which prevents individuals from advocating and fighting for broad structural changes that may be more effective in addressing environmental and social problems. Bain and Dandachi (2014) have argued that the non-GMO movement's rhetoric of sustainability and social issues has been replaced by neoliberal, individualist arguments enhancing consumer ability to make a free, informed choice. Furthermore, some scholars note that conscientious consumerism driven by quality assurance labels has a very negligible effect on the greater social and political spheres as well as on the environmental implications of the production side of consumption and the marketplace (Szasz 2007; Guthman 2007). Analysis of the frames utilized in the GMO labeling debates can reveal if there are calls for "individualization of responsibility", the address of broader socio-economic issues, or different rationales overall in the support for a GMO label. GMO regulations and labeling initiatives are examples of direct public contestation and engagement in an organized social movement in consumer politics within the agri-food system. Labeling and access to more information for consumers and/or citizens has the capability to produce better-informed, more

knowledgeable consumers in areas of food production and agricultural practices. However, it is important that labels are defined by clear standards that the public is aware of and understands. The federal labeling law that came out of Congress in 2016 has been criticized for narrowly defined standards that may not encompass all GMOs the public assumes will be labeled. It is important to understand the diversity of reasons as to *why* the public and stakeholders want to see a GMO label to help inform standard-making procedures for future GMO labeling rules and regulations.

The struggle over attaching a label involves more than simply making food production processes "transparent" but includes political struggles and contestation over how standards are defined, who creates the standards, who certifies the food product, and who oversees the labeling of the food product (Bain et al. 2013; Hatanaka et al. 2005; Timmermans and Epstein 2010; Goodman 2001; DuPuis 2002; Raynolds 2000; Bush 2011). The GMO movement and particularly the labeling movement taking place across the states is a political struggle to re-define producer-consumer relationships and which knowledge systems and political actors are given precedence. As Goodman and DuPuis (2002:17) state: "The 'politics' of food get played out in ways that include both the struggles of contested knowledges and the struggles to form political alliances that will become more stable political formations of the future." Investigating how supporters and opponents of GMO labels are framing their positions provide insight into which types of knowledge and actors consumers trust (or distrust) in "knowing food." This study is a novel contribution to the sociology of food and standards, and of consumer politics by investigating whose knowledge gains precedence in the development of GMO labeling policy. Utilizing frame analysis in social movements and the advocacy coalition framework, this dissertation research will also contribute to these literatures and policy analysis by examining the

influential frames and discourses disseminated in the GMO labeling movement taking place within this “new politics of food.”

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Chapter 2: Framing the Food System: A Content Analysis of U.S. Congressional Hearings Surrounding the Regulation of Genetically Modified Organisms (GMOs) in the Food System (2011-2016)

Abstract

The (non)-regulation of genetically modified organisms (GMOs) in the food system has been a contentious issue in the state and federal U.S. policy arenas as the public and policymakers debate the ethical implications and environmental and human health benefits and risks of this technology. After years of stagnation in federal and state regulation of GMOs and labeling of GMOs, a state GMO labeling law was enacted in 2016 in Vermont followed by the immediate passage of a federal GMO labeling law. Why has there been a sudden shift in the labeling policy surrounding GMOs? Drawing upon frame analysis in policy research, and utilizing five years of congressional testimony hearings, I analyze how witnesses and legislators frame the (non)-problem of GMOs and the solutions in terms of biotechnology regulation and/or labeling. Scientism and scientization in public policy development are also addressed. I conduct content analysis of witness and legislator testimony from congressional hearings from the 112, 113, and 114 Congresses (2011-2016) concerning genetic engineering to identify which stakeholders play a key role in the formulation of public policy surrounding GMOs and which frames are utilized the most in testimony. Despite overwhelming support for GMOs and the call for their continued limited regulation by witnesses in these Congressional hearings, the collective action frames utilized by opponent witnesses in the later sessions of Congress and the broader social movement for GMO labeling, were influential enough to force GMO proponents to reframe their previous arguments from the broad benefits of GMOs to socio-economic risks of a GMO label. Thus, socio-economic concerns were considered in the policy discussions surrounding biotechnology, which ultimately resulted in the passage of a federal mandatory GMO labeling law.

Introduction

Biotechnology has been a contentious issue in the political domain in the U.S., as citizens, activists and policymakers question the environmental, human health, and ethical issues behind the applications of this technology (Schurman and Munro 2010; Thompson 2014). Even with public apprehension towards this technology, adoption rates of GM crops have soared over the last ten years. Since the introduction of herbicide tolerant and insect resistant crops in 1996, the percentage of planted GM crops in the U.S. has grown immensely. GM corn grew from 25% of all corn planted in 2000 to 92% of all corn planted in 2016. GM soybeans encompassed 54% of all soybeans planted in 2000 to 94% in 2016 and GM cotton grew from 61% in 2000 to 93%

in 2016 (USDA ERS 2017). Proponents of GMOs cite the many benefits of GM crops as the main reasons for mass adoption rates by farmers, including labor efficiencies (field-wide spraying rather than weed-by-weed efforts) and decreases in pesticide use (Saletan 2015; NAS 2016). Proponents also cite future potential benefits such as increasing food production for rising populations, introducing nutrient-enhanced crops to nutrient-poor areas (Asis 2017; Curchoe 2017). However, critics contend that GMOs present risks for human health, impact the natural environment (i.e. general degradation, biodiversity loss), erode farmer agency, contribute to the loss of traditions in food culture, and further concentrate the role of corporations in the agriculture sector (i.e. further loss of the family farm) (Benbrook 2012; Kaur et al. 2013; Thompson 2014). The consensus from U.S. governmental agencies (Food and Drug Administration (FDA), Department of Agriculture (USDA), Environmental Protection Agency (EPA)) and scientific bodies (National Academy of Sciences) is that there is no increased human health risks with the consumption of GMOs (NAS 2016).

However, the legislative climate surrounding the regulation of GMOs has been far from settled. Between 1999-2016, a total of seventy-eight federal bills were introduced in Congress to address the regulation of GM crops and food. Bills ranged from the required labeling of foods containing GMOs, to establishing a task force to promote the benefits and safety of biotechnology globally, and to allocating different bureaus of government to approve the safety of GMOs before commercialization. In the three congressional sessions (2011-2016), the majority of bills related to GMOs introduced into Congress focused on the required or voluntary labeling of foods containing GMOs. On July 14, 2016, Congress passed S.764, The Biotech Labeling Solutions Act, deemed a GMO labeling compromise bill that requires labeling of foods containing GM ingredients. Labels can be displayed as a written label, such as “made with

genetically engineered ingredients", a symbol, or contained within a Quick Response (QR) code that consumers can scan with their mobile devices. One key facet of this bill is the preemption of any state mandatory GMO labeling bills already passed or in the process of passage. Anti-GMO advocacy groups deemed this hardly a compromise and referred to it as the "anti-labeling bill" (Charles 2016). Opponents criticized the preemption of state labeling laws within the bill and the implicit discrimination against those persons, such as impoverished or elderly populations, who may not have access to broadband internet or own a mobile smartphone to obtain the information contained within the QR code. Consumer rights groups also referred to this bill as "the new DARK (Denying Americans the Right to Know) Act" (Center for Food Safety 2016), comparing it to its predecessor The Safe and Accurate Food Labeling Act of 2015, introduced by U.S. Congressman Mike Pompeo (R-KS) in the 114 (2015-2016) session. The earlier bill established a voluntary non-GMO labeling certification and labeling process, likewise preempting state mandatory labeling laws. While that bill only passed the House, many aspects, including the preemption of state labeling laws made it to the final version of S.764. For legislators who supported S.764, they believed this bill enabled consumers to gain more information at their discretion and set a national labeling standard deemed much less confusing and cumbersome for food manufacturers and consumers than state-by-state labeling (Addady 2016; Roberts 2016).

While the public has debated the merits of biotechnology and numerous pieces of legislation were introduced into Congress concerning the regulation and labeling of GMOs over a twenty-year time span (1990s-2010s), actual policy change had been non-existent on the issue. However, between 2012-2016, there was a fervor of legislative activity at the state and federal level related to the labeling of GMOs, culminating in the passage of S.764 in 2016. This increase in policy debate and legislative activity at the federal level provides a rich data set to examine the

discursive influences on the policy process over a specific time period. I investigate the political debates on GMO regulation and labeling taking place in congressional committee hearings from 2012-2016 to identify influential key actors and rationales in the GMO federal labeling policy process. Analysis of policy discourses and framings utilized in policy discussions reveal certain interests guiding the political process, their potential influence on future governance and the influence of frames and discourses on policy transformation (Kinchy et al. 2008; Holleman 2012).

Sociologists and risk perception scholars have identified some reasons why the public are wary of the introduction of GMOs into the food system, such as lack of control over the technology, concerns about concentrated corporate control, unknown risks, delay in manifestation of harm and the novelty of the technology (Slovic 1993; 2000; 2012; Savadori et al. 2004; Roff 2007; Schurman and Munro 2010; Thompson 2014). Researchers have found that experts (specifically scientists) will usually weigh new technologies as less risky and more beneficial to address societal ills than the public (Wynne, 2001; Savadori et al. 2004; Cook et al. 2004; Slovic 2012). During the policy-making process, legislators call upon experts (i.e. witnesses) to serve as credible individuals providing in-depth objective knowledge on a particular topic (Howlett 2009; Keller 2009; Montpetit 2011). Experts can help legislators by providing specialized knowledge and predicting intended or unintended consequences of a policy. However, if experts narrow the stated risks of a technology to only include technoscientific criteria, this can further constrict whose "expertise" and participation are deemed legitimate in the development of policy surrounding that technology (Levidow 1998; Jasanoff et al. 2015). Therefore, analyzing the types (disciplinary and institutional affiliation) of experts and/or witnesses that are invited to speak at these committee hearings is important for my

analysis of policy discussions that ultimately lead to policy change. This research will address who is considered an "expert" on the issue of GMOs and GMO labeling according to legislators, how these "expert" witnesses strategically frame their arguments directed to affect policy and if there are changes in witnesses or framings over time.

In this paper, I argue that social movement activism in opposition to GMO development reshaped the debate to focus on specific socio-economic benefits and risks with the inclusion of a GMO label, rather than on the broad benefits or risks of GMOs. Specifically, the collective action frames utilized by opponent witnesses in the later sessions of Congress and the broader social movement for GMO labeling were influential enough to force GMO proponents to reframe their previous arguments from the broad benefits of GMOs to the specific risks of a GMO label. These findings suggest that public sentiment and effective collective action frames can influence the political process, even when they are presented as the minority opinion in institutional policy-making settings (such as a committee hearing). These findings also demonstrate the interactive process by which frames are constructed and their ability to change over time, which can depend on exogenous factors as well as changes in the opposing side's framing strategies. This paper is organized as follows. In the next section, I briefly discuss the historical background of the development of GMOs and the frames utilized to justify their continued development, and the evolution of the anti-GMO movements' strategies and discourse. I follow with the analytical framework that guided my methods, background on committee hearings as sites of political development investigation, and the analysis of the different framings utilized in the committee hearings. Drawing upon my data, I illustrate how the "consumer right to know" frame used by opponents was powerful enough to overcome the majority opinion in the Congressional hearings and forced GMO proponents to reframe their arguments to address socio-

economic risks previously deemed illegitimate in past debates about GMO regulation. In the final sections, I discuss my conclusions and the implications of the future biotechnology labeling law in present food politics.

Biotechnology Development and Discourse: An Optimistic Beginning

U.S. biotechnology developed in a neoliberal economic context, beginning in the 1970s, which stressed open markets, free trade, private property rights and individual initiative (McCarthy 2006; Schurman and Munro 2010). Market efficiency was deemed of utmost importance where a self-regulating market would produce the most optimal outcomes (McCarthy 2006). With the power of centralized government diminishing, private industries marketed products to address social ills in the areas of fair labor rights, sustainable forestry initiatives, and environmental standards, usually with added premiums attached (Bartley et al. 2015). In a climate of limited regulation, private investors gave biotechnology scientists freedom and funding to work on projects to address agricultural and social issues that could then be commercialized and patented for profit (Parayil 2003; Scharper and Cunningham 2006; Schurman and Munro 2010). Investors and scientists saw GMOs as a major solution to farmers' problems (including labor and input costs), a way to reduce the cost of food for consumers and produce a food surplus for poverty-stricken countries. For the biotechnology industry, the possibilities were endless in terms of the problems they could solve, the social ills they could cure, and the benefits they could bring to society as a whole. Mary Dell Chilton, one of the pioneers of plant biotechnology stated in 1984, "'The solutions are coming very fast now. In three years, we'll be able to do anything [with gene manipulations] that our imaginations will get us to'" (as quoted in Schurman and Munro 2010: 25).

In the 2010s, biotech proponents are still attempting to maintain that optimism despite critiques that promises were not fulfilled and were rather "airy claims about [GM crops'] pro-poor promise" (Glover 2010: 86) or "exaggerations of biotechnology achievements" (McAfee 2003: 213). Some biotechnology critics will cite biotechnology's failed efforts as evidence of these "exaggerations", such as the Golden Rice project in India, which was meant to address a public nutritional vitamin A deficiency. However, the project was never implemented as it was met with mass resistance by Indian civil society who viewed it as a quick technological fix and a "Trojan horse that may open the route for other GMO applications" (Potrykus 2001: 1160), additionally ignoring existing conventional solutions to vitamin A deficiency in the country (Shiva 2000; Greenpeace 2005). Nevertheless, biotechnology continues to be framed as a moral issue capable of addressing food insecurity and associated with concepts of progress and innovation by the biotechnology industry, scientists and U.S. governmental bodies as evidenced by limited regulatory oversight and increased research in transgenic crops by publicly-funded universities (Jasanoff 2005; Welsh and Glenna 2006; van den Daele 2007; Maeseele 2010; Dibden et al. 2013; Motta 2015). Monsanto, one of the largest GM companies, owning 80% of the U.S. GM corn and 90% of the U.S. GM soybean market in 2014 (Mitchell 2014), presents GM crops as an essential tool for addressing the main challenges for the future, including climate change (developing drought-resistant or nitrogen-fixing crops), population growth and food security (Glover 2010). Ron Stotish, the CEO for AquaAdvantage, the company that created and commercialized the first genetically engineered fish stated:

> We're soon to be 9 billion people on the face of the earth. We will need to grow over the next 20-30 years our ability to produce food by as much as 50%. We'll have to do that at a time when terrestrial and oceanic resources are limiting. There is not arable land to expand and explore for production. How are we going to meet the food needs of the future? The only answer that I am aware of is to

> produce our food more effectively, more efficiently and more sustainably…We will have to use the technology that we have available to us today to meet those global food security needs. Otherwise someone is going to have to eat less or food is going to have to become a lot more expensive (Stotish 2016).

For biotechnology proponents, frames pertaining to the moral and ethical benefits are equated with the promise or need for future funding and lasting potential of the industry. Glover (2010) discusses how the framing of GM as addressing environmental sustainability, international development and hunger was a strategic move by biotechnology proponents to convince investors and buyers of its importance for the long term.

Federal Regulation of Biotechnology

The framings of the environmental, sustainable and food security benefits of biotechnology along with the innovative potential it holds to address future problems have also been strategically employed by the biotechnology industry to avoid financially cumbersome and time-consuming national regulations. Newell (2009) coined the term "biohegemony" to demonstrate how biotech companies were able to gain support for reduced regulation in Argentina based on material, institutional and discursive power. Particularly with discursive power, biotech proponents emphasize its achievements and deflect any challenges to the technology. Thus, biotechnology proponents create a win-win narrative where any challenges or criticisms of the technology are deemed uninformed or inappropriate. Jasanoff (2005) compared the regulation of biotechnology across Britain, Germany and the U.S. and found that differences arise due to the capacity of each regulatory institutions' ability to address scientific, social and ethical uncertainties of the technology. The U.S. "approach on the whole favors innovation and risk-taking, regulated by the laws of the market…By contrast, both Britain and Germany have

opted for more cautious legislative solutions, allowing innovation to proceed only within a normative framework arrived at by law" (Jasanoff 2005: 152).

Presently GM crops in the U.S. receive minimal regulation and oversight. Before approval to plant and commercialize, GM developers are required to submit data to the federal government either requesting a permit to plant (which would entail oversight and data-sharing between the developer and the government department) or the developer can request a petition for their crop to maintain de-regulated status if they can demonstrate that their crop is substantially equivalent to its non-GM counterpart. If this can be achieved, then the crop will maintain nonregulated status and not require any government-mandated provisions, labeling or submittal of continual updated data from the developer. Some have questioned whether this is a truly transparent process in the approval of new GM crop varieties since the data submitted comes from the company developing (and profiting from) the GM crop itself (Roff 2007). The government does not conduct its own independent risk assessments but instead relies on the company's conclusions and recommendations. Currently many varieties of GM crops developed by Monsanto, Syngenta, and Dow have all nonregulated status (Philpott 2011; USDA 2017).

The Rise and Evolution of the Anti-GM Discourse

While the optimistic rhetoric of biotechnology has influenced investors and the U.S. government to propel its development through reduced regulatory oversight, not all individuals have been persuaded of its beneficial potential. Various social movements in the U.S. and globally have arisen against the continual, unencumbered development of GMOs since their introduction in the 1980s. Historically, the anti-GM movement has drawn upon a variety of arguments that have evolved over time as new issues arise to articulate their opposition. At the

beginning of the anti-GM movement (1980s), critics framed their opposition by contending that biotechnology embodied corporate domination and control of the agri-food sector in the U.S. as well as the global imposition of the West's input intensive monoculture farming techniques on Global South smallholder peasants (Stone 2002; Schurman and Munro 2010; Buttel 2005). The movement's discourse continued to evolve into the 1990s as anti-GM activists emphasized that any genetic manipulation was unnatural, unethical and risky (McKibben 2003). Buttel (2005) contends that in the 1990s and early 2000s the movement began to focus on human health and environmental risks associated with GMOs, potentially due to the aftermath of the bovine spongiform encephalopathy (BSE) or "mad cow" scandal (which heightened public fears surrounding contamination in food products) and the well-established environmental NGO network following the 1992 Rio Earth Summit. Activist strategies during this time focused on reforming and strengthening policy to regulate GMOs and instituting planting moratoriums at the state and county level (Buttel 2005; Walsh-Dilley 2009; Pechlander 2012). These strategies resulted in minimal success as regulations did not change and small-scale moratoriums were never able to scale-up from the local to the national level (Walsh-Dilley 2009; Pechlaner 2012).

Since 2012, the goals of the anti-GM movement have changed from promoting banning to labeling of GMOs (Bain and Dandachi 2014). States and counties began to introduce ballot initiatives and legislation for the mandatory labeling of GMOs. California's ballot initiative Proposition 37, the "Mandatory Labeling of Genetically Engineered Food Initiative" introduced in 2012, drew massive attention to the issue of GMO labeling. Prop 37 (as it was commonly referred to) ultimately did not pass but demonstrated the impact that this type of political action could have on the overall anti-GMO movement, as a cascade of other statewide GMO labeling initiatives ensued. Washington and Oregon followed with ballot initiatives in 2013 and 2014

respectively, both narrowly defeated. The Northeastern United States experienced limited legislative success, with labeling bills passed in Connecticut and Maine with a trigger clause attached and eventually Vermont (with no trigger clause) passed in 2014 and went into effect on July 1, 2016. These state labeling bills have been influential in sparking other state labeling bills and raising public attention about the issue, which ultimately permeated the national debate[1] (Bain and Dandachi 2014). According to the National Conference of State Legislatures (NCSL), 20 states introduced GMO labeling bills in 2016 (NCSL 2016). Proponents of these statewide and the recent federal labeling campaigns have focused on the rhetoric of "consumer right to know", the ability "to choose" in the marketplace, and "transparency" in the greater food system (Caswell 2000; Klintman 2002).

The Influence of Neoliberalism and Scientism in Policy Development

Reduced regulatory oversight is a fundamental aspect of the neoliberalist rhetoric of unencumbered global free trade, reduced trade barriers, and increased standardization of regulations related to food safety, human, environmental, and plant health, exemplified in the World Trade Organization (WTO) rules and measures (Rodrick 2011; Clapp 2012). The global trade rules emphasizing nontariff trade barriers and open markets have infiltrated the global biosafety frameworks and U.S. national regulatory policies, where environmental and health impacts are given precedence over socio-economic concerns. This is evidenced in the absence of public participation in decisions regarding the regulation and approval of biotech and economic losses suffered by small farmers due to lawsuits from biotechnology firms because of accidental

[1] Until recently, the GMO labeling movement had gained minimal traction on the federal front. A GMO federal labeling bill has been introduced into Congress under a variety of different names and different sponsors over the last ten years but had usually not made it out of one committee.

genetic contamination or loss of export markets (Binimelis and Myhr 2016; Kleinman and Kinchy 2003a; Walls et al. 2005; Kinchy et al. 2008; Kleinman and Kinchy 2007; Bonnueil and Levidow 2011). In policy discussions and debates on biotechnology regulation, the coupling of neoliberalism and scientism discourses have prevented the consideration of broader socio-economic impacts (Kinchy et al. 2008; Kleinman and Kinchy 2003a; 2003b). Assuming that science is value-free and politically neutral, scientism is defined as the "beliefs that policy is best dictated by scientific reasoning, since science is presumed to transcend human values and interests and to provide answers upon which all can agree" (Kinchy et al. 2008: 156; Jasanoff 1995; Pielke 2004; Sarewitz 2006; Proctor 1991).

Kinchy et al. (2008) analyzed the U.S. debates concerning the approval of the genetically engineered hormone recombinant bovine growth hormone (rBGH), concluding that socio-economic risks for small dairy farmers were not considered in the determination for commercializing the hormone. The only legitimate justification for keeping rBGH off the market would have been scientific evidence that the hormone caused human health harm (Kinchy et al. 2008). Similarly, in 1996, Vermont called for the labeling of milk made from cows treated with rBGH, but the bill was struck down in court because no significant difference was found between milk from treated and untreated cows (FDA only requires labeling if there is a significant difference in the final products). Additionally, the court ruled that consumer concern was not a valid enough reason to warrant a label (Runge and Jackson 2000; Lowe, 2015), implying that socio-economic considerations were not deemed legitimate. The ability for "scientism" discourse to prevent regulatory oversight in the U.S. has inspired biotechnology proponents to also attempt to de-politicize agricultural biotechnology by framing it as a neutral, dispassionate, rational scientific tool that follows the natural, inevitable process of scientific discovery (Kinchy et al.

2008; Maeseele 2010; Dibden et al. 2013). For example, Maeseele (2010) discusses how biotech proponents will "disavow critical reports [on GMOs] because they are not based on 'sound science' as they are produced by scientific charlatans" (291). By emphasizing the purely scientific aspect of the technology, it is removed from political discussions and framed as not needing regulation.

Policy discussions privilege "scientism" and neoliberalism and thus create a political arena where free market interests and scientific expertise outweigh others. In policy disputes, scientific experts' testimony and scientific evidence are given greater credence than non-expert moral, ethical or socio-economic arguments (Kleinman and Kinchy 2003a; Levidow 1998). Policy debates about broad social issues become overshadowed by scientization, where political debates take place among scientific experts, separate from the social context in which it occurs (Habermas 1970; Kinchy 2012). For example, in Kinchy's (2012) analysis of the social conflicts of GM canola in Canada and GM maize in Mexico, she showed that organic farmers were concerned about the loss of their organic certification from the threat of GM contamination and the threat on the cultural, symbolic and spiritual significance of corn varieties in Mexico. However, in court hearings on the subject, the judge deemed scientists to be experts but not farmers. Advocates confronted the scientization of the debate by conducting their own research, recruiting their own experts, questioning scientific evidence demonstrated in courts and ultimately calling for consideration of social and economic impacts of these technologies. Kinchy states at the end of her analysis:

> The persistence of social conflict over GE crops strongly suggests that it is time for new 'rules of the game' for the governance of technology, to reassess what is accomplished when we rule out considerations that are not easily categorized as scientific…changing the terms of debate is essential to the pursuit of a more sustainable, socially just form of agriculture (2012: 164).

Thus scientization narrows the discussion to only consider scientific discourse on an issue that can be upheld by statistics, risk assessments based on probabilities of likelihood and removed from the values and cultural ideals of a community.

The historical development of biotechnology and its accompanying promotional frames, in conjunction with the social movement frames in opposition to its limited regulation, give a broad background of biotechnology's path within the public and political realms. Bolstered by the privileging of scientism in policy discussions, biotechnology was able to maintain a trajectory of innovation, development and limited regulatory oversight over a twenty-year period (1990s-2010s) despite a steady stream of social movement opposition. However, beginning in the 2010s, the genesis of the labeling movement in the western U.S. propelled labeling movements across the country leading to state labels in the Northeast and specifically in Vermont. Subsequently, the issue of GMO regulation shifted to the federal level, which provides a rich set of data to examine the federal policy process, the major interests guiding this policy process, and the frames driving this debate that ultimately led to the passage of a federal GMO labeling law in 2016. The next section discusses the concept of framing in political discourse and the role of Congressional hearings in the policy process, thus setting the stage for my analysis of congressional hearing testimony on biotechnology regulation.

Framing in Political Discourse

In policy development, political actors or policy entrepreneurs attempt to recruit support for a policy by creating messages or narratives that will sway favor for a particular policy decision over alternatives (Chong and Druckman 2007; Baumgartner et al. 2009). These narratives or messages can also be considered as frames, defined by Bateson (1972) as

"metacommunicative devices that set parameters for 'what is going on'" (Oliver and Johnston 2005: 188). The creation of frames by policy entrepreneurs are purposeful, strategic assemblages, "to promote a particular problem definition, causal interpretation, moral evaluation and/or treatment recommendation" (Entman 1993: 52). Policy entrepreneurs may also reframe issues by trying "to raise the salience of a particular aspect of a problem or of a particular solution to the problem" (Baumgartner et al. 2009: 167). Frame analysis has been a widely-practiced method in the social movement literature to understand the mobilization strategies and trajectory of various social movements (Walgrave and Manseens 2005; McAdam et al. 1996; Haydu 2012; Klintman 2006; Hewitt and McCammon 2005) with a focus on the development and impact of "collective action frames" that "inspire and legitimate the activities and campaigns of a social movement organization" (Benford and Snow 2000: 614).

Successful collective action frames involve three tasks: 1) diagnostic framing, which identifies the problem, 2) prognostic framing, which identifies a solution, and 3) motivational framing, which describes the ways in which to solve the problem and motivates people to act (Snow and Benford 1988). "Master frames" are collective action frames that have been used cyclically throughout social movement history as they resonate with a broad range of interest groups and audiences time and time again (Snow and Benford 1992). For example, food security and sustainability frames have been identified as "master frames" or "consensus frames" because of their ability to unite wide-ranging groups and interests in social movements (Kessler et al. 2016; Mooney and Hunt 2009). For many issues, stakeholders will identify multiple frames to explain a problem or highlight a solution. For example, Rahn et al. (2016) found that supporters of raw milk legalization in the U.S. utilized frames such as health benefits, personal freedom, anti-big government regulation and support of local food to achieve their policy goals. The

authors theorized that these frames were effective in mobilizing broad-based support and getting the issue on the political agenda because they aligned with the "master frame" of "individualism, anti-statism, and localism" (Rahn et al. 2016: 19).

While there has been extensive research on the collective action frames used by challengers to the status quo in social movement research, scholars have noted there is a lack of research in the analysis of "official frames" (i.e. frames promoted by state agencies or powerful elites in politics) (Noakes 2005). State agencies and elites in politics usually hold substantial influence in the policy development process, have access to greater financial resources and are backed by a team of interest groups with more expertise (Baumgartner et al. 2009; Giddens 1987). Therefore, frames employed by these actors may hold greater weight in policy decisions. In general, these actors are also trying to maintain the status quo and as Noakes (2005) states in his research on Federal Bureau Investigation (FBI) frames utilized during the communist threat, "Familiarity is more likely to breed acceptance than contempt" (102). In the anti-biotechnology movement, many biotechnology industry organizations, science advocacy groups, university scientists, and food manufacturers have maintained staunch support for the biotech industry and call for continued support and deregulation of GMOs, which has been reflected continuously in U.S. policy. However, the construction of an official frame does not guarantee its success (Noakes 2005). If an official frame does not resonate well with the cultural values or beliefs of the public then it could undermine the legitimacy and authority of the ones in power. This could create a political opportunity for certain actors to engage and successfully promote a collective action frame.

Recent scholarship has investigated different framing strategies from opposing sides of an issue by evaluating variable interpretations of a similar collective action frame. For instance,

Fiss and Hirsh's (2005) analysis of the emergence of globalization discourse adapted Goffman's (1974) concept of "keying" to differentiate between critical views of globalization and positive views within the same frame. They evaluated frames based on if they were "positive," negative," or "neutral" enabling them to identify normative frames within the complex discussion of globalization (35). Critical views were deemed "sharp" frames and positive views were "flat" frames. Mooney and Hunt (2009) followed a similar method in their analysis of the "master frame" of food security. The practice of "keying" can identify normative functions of frames and illuminate struggles between institutionalized power and outside challengers (Mooney and Hunt 2009; Eaton et al. 2014).

In this study, I employ "keying" to unpack many of the issues associated with the biotech debate and help to illuminate different interpretations of a similar frame. In the biotechnology debate for example, GM proponents may state the benefits of GMOs such as addressing food security issues, helping global development and mitigating environmental deterioration. Through these frames, proponents wish to reinforce the dominant institutionalized practices currently in place with deregulation of biotechnology, free trade, and the concept that optimal welfare comes from market exchange of goods. However, opponents will criticize the very concept of unregulated free trade and deregulation to solve social ills, instead focusing on the environmental risks from GM crops, the smallholder farmer's loss of agency in the global corporate control of GM crops, and promote the benefits of localized sustainable production. Contained within these frames are values and visions of what a "good society" embodies. In science and technology studies, these normative frames can also be considered as "socio-technological imaginaries" where "collectively imagined forms of social life and social order [are] reflected in the design and fulfillment of nation-specific scientific and/or technological projects" (Levidow &

Papaioannou 2013: 38). These imaginaries promote certain idealized futures achievable through technological developments ultimately fulfilling "the public good" (Jasanoff & Kim, 2009: 12). Evaluating frames based on their normative functions and idealized futures can contribute to a greater understanding of the proponents' and opponents' values in the contentious political field of biotechnology in the food system and ultimately which "imaginary" prevails in its codification into policy.

Congressional Testimony and Influence on Public Policy

The policy-making process in the U.S. has evolved to include a greater number of participants, thus increasing the influence of outside interest groups involved in policy deliberations (Boston et al. 2013). Legislators rely on many government and non-government experts in decision-making to evaluate the effectiveness and consequences of a proposed policy (McGann and Johnson 2006; May et al. 2016). Congressional hearings are informative venues for health and environmental policy development with political actors making decisions regarding socially and scientifically complex problems (Baumgartner and Jones 2009; Liu et al. 2011; Oleszek 2013). Information presented at congressional hearings by outside experts, interest groups or legislators are organized and presented as causal arguments or claims (i.e. frames) to promote a certain policy in a convincing way (Andrews 2011; McCammonn et al. 2001). Members of Congress find value in holding hearings as it provides them with an influx of new information on a topic and a venue where they can attempt to exert influence on a policy or bill they may be supporting themselves (Kingdon 1989; Gormley 1998; Mattei 1998). Interest groups and other experts who are invited to serve as a witness in a hearing also believe their

testimony is influential in policy discussions (Baumgartner and Leech 1998; Kingdon 2011; Smith 1995).

Congressional hearings are an "underused phenomenon" in the policy development process and can provide insight into measures of influence in the political process (Leyden 1995; 431). Burstein and Hirsh (2007) found in their content analysis of testimony from 66 hearings over 20 years (1973-1999) that information provided by supporters of a policy (specifically as it relates to policy effectiveness) will increase the likelihood of that policy's enactment. Subsequently information that focuses on the ineffectiveness of a policy by opponents and unintended consequences resulting from implementation of that policy decreases likelihood of passage. Past policy development research has found that witness testimony on an issue affects specific content in federal bills (Burstein 1998; Baumgartner and Jones 2009; Johnson 1995). Therefore, by investigating the current congressional hearing testimony surrounding biotechnology regulation, I can explore the influential discourses that led to the shaping of the recent passage of the federal biotechnology labeling law. However, the ability to testify at a congressional hearing is not necessarily an equal access opportunity. All witnesses who testify at congressional hearings (whether through oral testimony and/or written) must be invited by a legislator on the committee holding the hearing and majority party leaders hold more power than others.[2] Hence committee hearing witness lists may be more of a reflection of the majority party leader's preferences and biases rather than a well-balanced perspective on an issue. Also, specifically for interest groups' accessibility, Leyden (1995) found that groups with Washington-

[2] The majority party leader and members of the majority party can invite any witnesses of their choosing. Minority party members on the committee are allowed at least one hearing day to invite witnesses of their choice (Davis 2015). In general majority party leaders have the power to invite whomever they deem credible and necessary for the hearing.

based lobbyists and supporting staff (i.e. more monetary resources) are more likely to build relationships with policymakers, gain access to congressional hearings and have a greater measure of influence on the policy process. Hence, one would expect that certain interest groups and participants reflecting the majority party's interests and holding greater resources will have the greatest influence on the political process through committee hearings.

Methods

In order to identify hearings related to the regulation of GMOs, the Congress.gov website was used to find congressional bills that were introduced into the House of Representatives and Senate over the last three sessions (2011-2016) in Congress related to the regulation and/or labeling of biotechnology and GMOs. Search terms utilized in the Congress.gov database included "biotechnology", "genetically engineered" and "genetically modified organism." For each bill that was introduced over these three sessions related to biotechnology, the committees where that bill was referred to were noted and cross-referenced with the Government Publishing Office (GPO) to find hearings for each committee and year where a bill related to biotechnology was referred. The GPO is the federal government repository for official information products of the U.S. government, including official publications of Congress and the White House (U.S. GPO 2017). In addition to searching congressional hearings from the GPO, information and hearings were cross-referenced with Proquest Congressional to search for Congressional hearings related to biotechnology that also included unpublished hearings.

A total of eight hearings from these three sessions in Congress were collected that were related to regulation and labeling of GMOs (Table 1). Content analysis was performed (Neuendorf, 2001; Liu et al., 2015) on each piece of oral and written testimony and statements

within each hearing. Each piece of testimony was analyzed by first reading through the data and performing open coding to bring forth the main ideas or themes. After initial coding, focused coding was performed to identify the most emergent categories and develop a detailed codebook (Charmaz 2014) (the coding scheme can be found in Appendix E). Utilizing frame-analytic approaches drawn from Snow and Benford (1992), Noakes (2005), Fiss and Hirsch (2005) and Mooney and Hunt (2009), transcripts were coded based on how individuals identified the (non)-problem of GMOs, if and how GMOs could be the solution for present and/or future problems, if other alternatives should be explored to solve future problems, and specifically how the government should be involved in these solutions. Overall four main categories were identified after the coding analysis: 1) the main benefits or risks of GMOs, 2) rationalizations for support or opposition to GMOs, 3) proposed solutions in terms of continued support or opposition to GMOs, and 4) perspectives specific to the labeling of GMOs including risks of a label, benefits of a label and rationalizations for why a label was (un)necessary. Coding was conducted using qualitative data software program *Atlas.ti*.

Before coding each testimony, I categorized each actor giving testimony or opening statements within each hearing by their institutional affiliation. For the eight hearings under study, there were a total of 44 witnesses that testified (See Appendix F for complete listing of witnesses, their affiliation, researcher coded affiliation and hearings where they testified). Thirteen witnesses (30%) were representatives of various food and grain industries, nine were university scientists (20%) in disciplines such as genomics, international development and animal science, eight (18%) were government officials representing local state governments or federal agencies such as the FDA, EPA or USDA, seven (16%) were farmers or representatives from farmer interest groups, five (11%) were from non-governmental organizations (NGOs), one

was an author and one was a medical doctor. In addition to the testimony provided by witnesses, 65 pieces of opening statements and comments from legislators included on the record were analyzed and coded. Frequency of codes was noted throughout the coding process as a measure of intensity of concern (Denzin and Lincoln 2000). Descriptive statistics were derived from how many times certain frames were used throughout all of the testimony together, broken down temporally by congressional session and by each actor's affiliation. These descriptive statistics provide insight into which frames were most frequently emphasized throughout the pieces of testimony. Noting this emphasis gives insight into which frames policymakers were most frequently presented with at these hearings, whether from witnesses or other legislators and which frames witnesses and legislators providing testimony thought were most effective and important to highlight in their abbreviated time with policymakers. The breakdown of results by actor affiliation over time offers valuable insight into the policy-making formation process surrounding GMOs and GMO labeling and the roles of certain actors in the food policy process.

Table 2.1 Congressional hearings in the House of Representatives and Senate related to biotechnology regulation from 2011-2016

Date	Title	Branch	Committee	Subcommittee
112th Session (2011-2012)				
June 23, 2011	Hearing to Review the Opportunities and Benefits of Agricultural Biotechnology	House of Representatives	Agriculture	Rural Development, Research, Biotechnology, and Foreign Agriculture
December 15, 2011	Environmental Risks of Genetically Engineered Fish	Senate	Commerce, Science, and Transportation	Oceans, Atmosphere, Fisheries, and Coast Guard
113th Session (2013-2014)				
July 9, 2014	Hearing to Consider the Societal Benefits of Biotechnology	House of Representatives	Agriculture	Horticulture, Research, Biotechnology, and Foreign Agriculture
December 10th 2014	Examining FDA's Role in the Regulation of Genetically Engineered Food Ingredients	House of Representatives	Energy and Commerce	Health
114th Session (2015-2016)				
March 24, 2015	Examination of the Costs and Impacts of Mandatory Biotechnology Labeling Laws	House of Representatives	Agriculture	-
June 18, 2015	Biotechnology Food Labeling Standards	House of Representatives	Energy and Commerce	Health
June 25, 2015	Hearing to Review USDA Marketing Programs	House of Representatives	Agriculture	Biotechnology, Horticulture. and Research
October 21, 2015	Agriculture Biotechnology: A Look at Federal Regulation and Stakeholder Perspectives	Senate	Agriculture, Nutrition, and Forestry	-

Results

Appendix E illustrates the coding scheme for the testimony from all eight Congressional hearings in percentages divided by actor affiliation within each session of Congress. The majority of witnesses (36 out of 44, 82%) who were invited to testify were in favor of GMOs and generally opposed to statewide labels. The majority of legislators (56 out of 65, 83%) were also in favor of GMOs and generally opposed to statewide labels (Figure 1). Collecting all testimony and legislator statements together, out of 109 pieces of individual testimony and statements coded, 83% were in favor of GMOs and generally opposed to statewide labels. A total of 19 (17%) pieces of testimony were in opposition to GMOs and generally in favor of labels, whether state or federal.

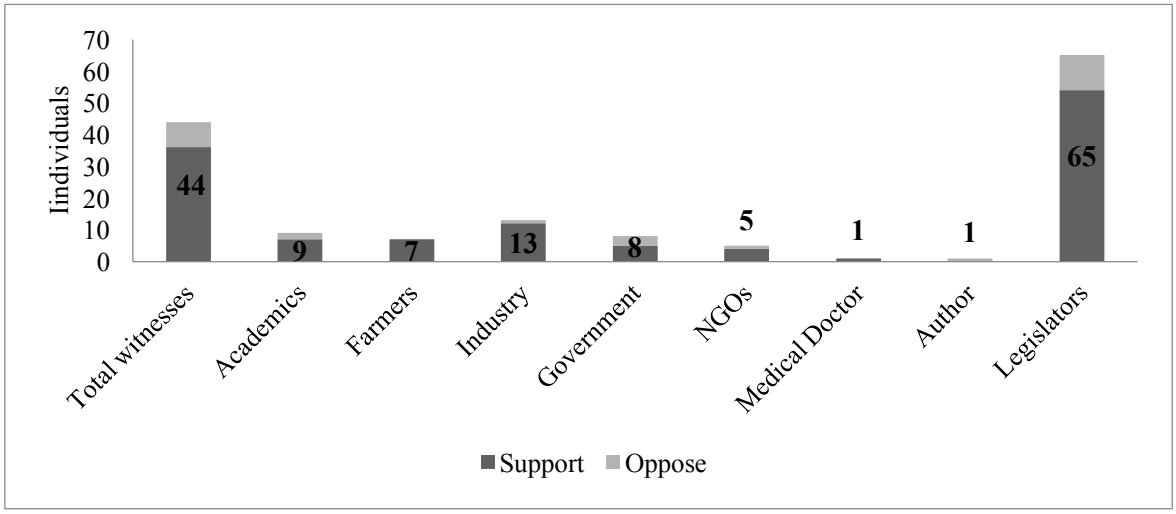

Figure 2.1 Total number of witnesses and legislators who testified or commented in congressional hearings (2011-2016) related to the regulation of biotechnology by affiliation and organized by general support or opposition to GMOs

Evolution of Frames

Looking at the Congressional testimony frames over time, there is a stark shift in the frames utilized in the 112 Congresses for proponents and opponents compared to the 113 and 114 Congresses (Table 2).

Table 1.2 Most frequently used frames by GMO proponents and opponents categorized by legislative session

	112th Congress (2011-2012)	**113th Congress (2013-2014)**	**114th Congress (2015-2016)**
GMO proponents most frequently used frames	*1) Importance of innovation* (19.8%) 2) *Food security benefits* (12.0%) *Scientific evidence shows it is safe* (12.0%) *3) Environmental benefits* (11.2%)	1) *Scientific evidence shows it is safe* (14.3%) 2) *Economic risks with a label* (10.3%) 3) *Farmer Benefits* (8.7%) *We need uniformity with a labeling system – state labels are confusing* (8.7%)	1) *Scientific evidence shows it is safe* (12.1%) 2) *Economic risks with a label* (10.7%) 3) *Consumer Rights - A label will only confuse consumers* (8.2%) *Environmental Benefits* (8.2%)
GMO opponents most frequently used frames	1) *We need broader oversight and better expertise for GMO regulation* (23.7%) 2) *We need to exercise caution before approving GE* (11.1%) 3) *We need more scientific evidence* (10.4%)	1) *This is a consumer right to know issue* (36.4%) 2) *Environmental risks* (12.7%) 3) *We need uniformity in a labeling system – need a federal label* (10.9%)	1) *This is a consumer right to know issue* (23.3%) 2) *A label would not be a warning – only information* (13.7%) 3) *Environmental risks* (12.3%)

The only proponent frame that is consistently used throughout all three Congresses is the scientific evidence of safety, utilized most frequently in proponents' testimony in the 113 Congress (14.3% of testimony) and 114 Congress (12.1%) and second most frequently (12.0%) in the 112 Congress. Hence proponents attempted to depoliticize the issue by focusing on the purely scientific aspects of the technology, illegitimate of social regulation. Furthermore, if the government was going to pass any sort of policy, it should be based on the best available science. Val Giddings, Senior Fellow at the Information, Technology and Innovation Foundation stated from the 2015 hearing on H.R. 1599 The Safe and Accurate Food Labeling Act:

> The bipartisan endorsement supporting the science-based approach to regulation that has been in place in the United States for the past four decades has been absolutely essential and made it possible for this technology to be developed, adapted and disseminated. The intention of H.R. 1599, to extend this legacy of bipartisan support for science-based regulations, is important as special interests seek to undermine its credibility and authority with false claims and ill-considered policy proposals at every level, particularly the state level (Biotechnology Food Labeling… 2015).

Tied within this quote about the primacy of science-based regulations in government policy is biotechnology's dependence on those science-based regulations to thrive as an innovative science.

112 Congress (2011-2012)

For the 112 Congress the importance of innovation was the most popular frame utilized by proponents of technology and resonated well as it was a frequently used frame across all actors (27.3% for academic, 14% for farmers, 17.4% for industry and 18.2% for legislators). The frame contended that if the safety of GMOs was questioned by the federal government (either through stronger regulations or blatant statements questioning their safety), innovation would

greatly suffer which could have detrimental impacts on the U.S.'s leadership in biotech innovation, global rising populations, and a changing climate. In the 2011 Hearing to Review the Opportunities and Benefits of Agricultural Biotechnology, Charles Conner, the President of the National Council of Farmer Cooperatives stated:

> Without a doubt, the next generation of biotech crops will continue to increase crop yields helping U.S. producers feed and clothe the world. The U.S. must continue to lead the way with innovation, product development, and the acceptance of biotech crops (6).

The importance of supporting innovation, science-based regulation and scientific evidence all hinged on the major benefits GMOs afforded or could afford for the future. Witnesses and legislators proclaimed the food security (12.0%) and environmental benefits (11.2%) of GMOs, which again resonated well with witnesses and legislators as these frames were cited frequently across all actors. Dr. Claestous Juma states:

> Today, growing human numbers given, the problem is to feed them. However, skeptics cast a dark shadow over the prospect of using biotechnology to address the global food crisis. The United States has been a leading light in agricultural biotechnology and continues to serve as an important role model for countries around the world seeking to address the challenge of food security (Hearing Opportunities and Benefits of Ag Biotech 2011: 18).

Timothy Johnson (R-IL), the Chair of the Subcommittee on Rural Development, Research, Biotechnology, and Foreign Agriculture stated:

> In our daily lives, we are inundated with statistics. Among the most poignant are those dealing with population projections and the resulting demand on our food production systems to provide food security into the future. The United Nations is predicting that our population will grow by 1/3 by halfway through the century. Feeding the 9.1 billion people on the planet would require a 70 percent increase in ag production (Hearing Opportunities and Benefits of Ag Biotech 2011: 1).

He goes on to state that our options include producing on "lands with fragile soils and poor water resources or we can make the smart choice of increasing the production capacity of plants and animals themselves", essentially reached through biotechnology development (1). GMO proponents also cited environmental benefits including decreases in pesticide applications and less soil erosion with the growth of biotech crops.

Opponent frames in the 112 Congress mostly called for increased regulation and broader government oversight (23.7%). The hearing from this Congress was focused on the approval of GE fish, specifically the commercialization of the AquaAdvantage GE salmon. Witnesses and legislators referred to additional governmental bodies who should oversee the approval of the fish, such as the National Oceanic and Atmospheric Administration (NOAA) or the Fish and Wildlife Service instead of only the FDA's Center for Veterinary Medicine, which regularly approves animal drugs. Opponents to the approval of the GE fish questioned whether the GE fish should be interpreted as an animal drug in the first place and if the FDA should be the sole agency to determine food safety *and* environmental impacts before approval. Senator Olympia Snow (ME-R) stated in her testimony, "The FDA is using an approval process originally created to review new animal drugs that the agency has interpreted to include genetically engineered or modified fish. This is an outdated and inadequate approach to evaluating a technology of this magnitude (Environmental Risks GE Fish, 2011: 4). She goes on to recommend that the "FDA should be capitalizing on NOAA's expertise in marine ecology, aquaculture, and the protection of threatened and endangered living resources by engaging NOAA in a formal consultative process (4). Dr. John Epifanio, a fish conservation geneticist at University of Illinois stated:

> Specific expertise in the biology of the species in question are crucial. Certainly FDA has experience with food and drug science, where as other Federal agencies and state agencies are more versed in salmon biology and the unique qualities on the environment that

> they generally occupy – specifically NOAA, Fish and Wildlife Service and the states (Environmental Risks GE Fish 2011: 30).

Frames also focused on the need to stress caution in the approval of GE fish as this would set a precedent for the approval of future GE animals (which many opponents saw as future unfettered approval with lax oversight and consideration). Paul Greenberg, author of *Four Fish: The Future of the Last Wild Food* stated in his testimony:

> How Congress and the Food and Drug Administration address the application for the first genetically engineered animal destined for human consumption will set a precedent for all applications for GE fish that follow it. While science cannot predict with certainty what the outcomes will be if engineered fish escape into natural ecosystems, given what is at stake, considerable caution is warranted (Environmental Risks GE Fish 2011: 45).

Senator John D. Rockefeller IV (D-WV), chair of the Committee on Commerce, Science, and Transportation stated:

> Hopefully this hearing will serve as a call to reason and bring greater attention to these concerns. Because again, it's not just about this one company or this one fish. It's about the precedent that may be set. There is potential in GE animals, but we need to make sure that we fully understand the risks involved, so that we not live in regret unleashing the environmental equivalent of a Pandora's Box (Environmental Risks GE Fish 2011: 69).

Overall, opponent witnesses and legislators focused their testimony on the need for greater oversight and caution in government regulatory processes. These calls for oversights were seen by GMO proponents at the time as hindering innovation, investment and the growth of the biotechnology sector, further hindering the social progress society could make with biotechnology for the future.

113 and 114 Congresses (2013-2016)

As the GMO labeling movement gained momentum, frames utilized by GMO opponents in the 113 and 114 Congress began to shift to frames focused on individualized consumer rights, transparency, and access to information. The "consumer right to know" frame became the most frequently used frame throughout all of the opponents' testimony for the 113 (26.4%) and 114 (23.3%) Congresses. These frames resonated well across all witnesses and legislators who spoke in favor of GMO labels. For government witnesses and legislators in the 113 Congress the "consumer right to know" frame encompassed the majority of their testimony (61.5% and 60% respectively). And for all groups of opponents to GMOs across both congressional sessions, the consumer right to know frame was most frequently referenced.

Todd Daloz, Assistant Attorney General for the state of Vermont gave testimony at the hearing for the Safe and Accurate Food Labeling Act in 2015 that would have set federal standards for voluntary labels of GMOs and outlawed any state-mandated labeling laws. Daloz stated:

> The proposed bill would deprive American consumers of information they want to have when deciding what foods to eat and how to spend their money…Insisting that this information be kept from consumers is profoundly disrespectful of the American consumer's right and ability to make intelligent, informed choices (Biotechnology Food Labeling… 2015).

Opponents also discussed how inclusion of a label would not be interpreted as a "warning label" to consumers (about which many proponents of GMOs and opponents of labels warned). Gary Hirschberg, the CEO for Stoneyfield yogurt and the founding member of the "Just Label It" campaign stated, "I know from experience that a value-neutral disclosure will not cause sudden shifts in consumer behavior. In fact, a recent five-year study of consumer data confirmed that

American consumers will not view a GMO disclosure as a warning" (Ag Biotech…Fed. Regulation, Stakeholder Persp. 2015: 39). Along with calls for a label and the need to access information, opponents also cited environmental risks from GMOs including actual increases in herbicide sprayings with the planting of GMOs and the deleterious effect this could have on waterways and cropland.

Witnesses testifying against a GMO label now included representatives from the food industry as well as government, academic and science-advocacy groups. The focus of their testimony changed from potential benefits GMOs could provide, such as food security or innovation leadership in the U.S., to the detrimental socio-economic impacts a label could have on local businesses, consumers and farmers. While GMO proponents in the 113 and 114 Congresses still tried to depoliticize the issue of GMOs by stating that scientific evidence shows they are safe, the second most popular frame utilized was the economic risks with a label. Costs would increase for manufacturers to repackage products, separate ingredients, and liability would increase for a company if an unlabeled product was found on a store shelf accidently. Testimony specifically focused on how interstate commerce would suffer with a state label and how these increased costs would be passed down to the consumer, increasing the price of food. Witnesses highlighted that small local businesses would be impacted the most by the inclusion of a label. Thomas Dempsey, President of the Snack Food Association stated in his 2015 testimony, "To be clear, the hardest hit by this will be one-plant operators with a single line of production. These costs could put family-owned businesses out of business and increase consolidation of the industry" (35). Witnesses attempted to make the connection that an increase in manufacturing costs with a label would not only be felt by large multinational businesses but the small, local

companies as well. Witnesses also discussed how a label would not fulfill any sort of "consumer rights" but only create more confusion in the marketplace.

These statements of economic risks and consumer confusion with state labels paved the way for an argument about the need for uniformity in a labeling system, essentially arguing for a voluntary federal standard. G.K. Butterfield (R-NC) stated that "a patchwork of differing state laws" would "only cause confusion and do little to provide greater transparency" (Biotechnology Food Labeling… 2015). He went on to state in his testimony that:

> Without a federal standard, those farmers and manufacturers will be forced to comply with uneven, costly and potentially misleading and onerous state-by-state mandates. Compliance will require new, costly supply chain infrastructure that will disrupt the nation's food supply, cause confusion and uncertainty (2015).

Farmer benefits from GMOs were also cited slightly more prominently in the 113 Congress. Joanna Lidback, a small dairy farmer from Vermont, was called upon to testify at three different hearings within the 113 and 114 Congresses. She spoke twice to the House of Representatives Committee on Agriculture (in 2014 and 2015) as well as the Senate in 2015. Her testimony mostly focused on the benefits of GMOs to her small dairy farm, such as higher crop yields and thus higher income for her family. She stated in her testimony on the benefits awarded by biotechnology, "We believe in the science and the capability of biotechnology and its role in protecting the sustainability of our farm. Biotech crops are essential to feeding our cows and calves [and] GMOs are also key to our economic sustainability" (Hearing…Societal Benefits of Biotechnology 2014: 28). She goes on to state, "I am happy to continue to speak up for our right to farm in the best way we know possible; which in our case includes biotechnology and the use of GMOs" (31). Here farmer benefits were framed in helping a small, local Northeastern farmer

(rather than the large monoculture type farms tied to agribusinesses) and the freedom and capabilities GMO practices awarded these types of farmers.

Discussion

The majority of witnesses invited to testify on the issue of biotechnology were in favor of biotechnology and represented the grain or food industry, even as the momentum for GMO labeling began to build. In fact, as time went on, the breadth of proponent witnesses increased including NGOs, government officials and a medical doctor to supplement farmers, academics and industry. This is likely reflective of the preferences and policy opinions of the chairmen of each of these committees. Out of the eight hearings under study, seven of the committees (and/or subcommittees) were chaired by legislators who made positive claims about GMOs.[3] Therefore, the ratio of GM supporters to GM critics in these hearings suggests an orchestrated policy move by committee chairs who were pushing for the continued deregulation of GMOs. This makes the eventual passage of the labeling law that much more significant, because majority opinion in committee hearings alone did not equate to policy passage.

In the 112 session of Congress, proponents of GMOs seemed to control the overall discussion of biotech regulation by emphasizing the positive, moral and economic potential benefits GMOs held for the future. GMO opponents followed this rhetorical trend with their frames and rationales based on the concept that biotechnology would stay on a trajectory of continued development and innovation. Therefore, they stated that we need to institute better, more thorough governmental oversight to increase accountability. Both proponents and

[3] The only hearing where the chairman did not make explicit statements in support of GMOs was the one concerning the approval of GE fish where the majority of witnesses in that hearing were against GE salmon commercialization.

opponents acknowledged the inevitable scientific progress with GMOs. Opponents just emphasized the need for a few more checks and balances along the way. However, these "checks and balances" never came to fruition as there were no major regulatory changes in approval and commercialization of GMOs and the GE salmon (under debate in the 2011 hearing) was approved by the FDA in November 2015 with no references to greater or broader oversight by other government agencies (Pollack 2015).

With the success of the state GMO labeling campaigns across the U.S. beginning in 2012, labeling began to appear more prominently on the national political agenda. The labeling movement was building momentum, sharing resources across states, and mobilizing more individuals and interest groups. Social movement actors expressed their grievances through a consumer rights frame and increased access to information. This individualized rights frame used by critics of GMOs could also be considered a "master frame" that is able to reach a broad range of interest groups and can culturally resonate with audiences over time (Snow and Benford 1992). In Rahn et al.'s (2016) study of frames used in raw milk legalization, individualism was found to be a successful master frame used by supporters of raw milk sale legalization. The opponents' consumer/individualized rights frame forced GMO proponents to abandon their idealized "socio-technological imaginaries" (Jasanoff and Kim 2009; 120) of biotechnology leading to idealized futures (food security and environmental benefits) in GMO debates and instead focus on socio-economic risks (on consumers, farmers, and businesses) linked to the inclusion of a label. The reframing strategies by GMO opponents changed the terms of the debate to consider socio-economic benefits and risks in the greater debate around biotechnology, confronting the scientism-only rhetoric in past biotechnology regulation discussions.

In this new form of food politics where consumers are turning to the market to demonstrate their environmental, social, economic and political preferences through purchasing decisions, it is understandable why a consumer rights frame gained such popularity and success in the public and political arena. Defined as "reflexive consumption" (Goodman and Dupuis 2002) or "conscientious consumerism" (Bartley et al. 2015), consumers make purchasing decisions based on the environmental or socio-economic characteristics of the product they support, such as Fair Trade certified, organic certification or "green" environmentally friendly products (Kysar 2004; Neilson 2010; Soper 2004; Micheletti 2003; Bostrom and Klintman 2008). Consumers can express their "politics via markets" (Lipschutz and Rowe 2005). In order for consumers to participate in this new form of food politics, they must have access to information about the food product, which requires food manufacturers to be transparent about their production methods through labels. Hence a "consumer's right to know" rhetoric and a call for "informative labels only" empower consumers to make better decisions regarding their food choices and embody normative notions of larger participation and accountability by citizen-consumers (Mol 2015). GMO opponents' shifting of frames from increased regulation to increased information through market mechanisms reflect the neoliberalization of food and agricultural sectors and the success of the labeling movements in the states.

The GMO opponents' reframing of the GMO regulation and safety issue to a GMO labeling issue forced GMO proponents to reframe their argument to defend socio-economic concerns that had not been deemed legitimate in past biotechnology regulatory debates. In previous biotechnology controversies, such as the commercialization and labeling of rBGH within the U.S. and specifically Vermont, socio-economic interests of farmers and consumer demand were not sufficient to warrant delay in the GE hormone's approval or to force inclusion

of a label, as the principles of scientism were invoked in this regulatory debate (Kinchy et al. 2008). However, in the 113 and 114 sessions of Congress, socio-economic concerns had become the leading concerns for labeling proponents *and* opponents. While labeling opponents still attempted to depoliticize GMOs by highlighting scientific evidence demonstrating safety, they also argued that economic interests of businesses, farmers and consumer confusion were enough to warrant *the absence* of a label. In the later sessions of Congress, labeling opponents also attempted to highlight farmer socio-economic benefits of GMOs and detrimental economic impacts for small farmers if a label was required. Joanna Lidback, a small local dairy farmer was invited to testify in three different hearings, rather than the President of the National Council of Farmer Cooperatives and the National Corn Growers Association (who had submitted testimony in the 112 Congress). In a 2015 hearing, Lidback describes her farm as a "50-cow dairy in the beautiful Northeast Kingdom of Vermont. In addition to selling our milk to the co-op we…raise Jersey steers to sell beef locally…producing food for our little corner of the world" (Agriculture Biotechnology: A Look at Federal Regulation and Stakeholder Perspectives: 35). With the inclusion of smaller farmers talking about their local food production and direct-sale marketing, labeling opponents may have been trying to highlight how GMOs can benefit small and local farmers and their communities, invoking "localism", a recurrent theme in food activism associated with food democracy, civic agriculture and social justice (Hassanein 2003; Lyson 2004; Barnett et al. 2005; DuPuis and Goodman 2005). "Localism" frames have also been identified as "master frames" along with individualism and anti-statism, capable of resonating with broad audiences (Snow and Benford 1992). In the 2014 Hearing to Consider the Societal Benefits of Biotechnology, Lidback paints a localist, pastoral image, describing her farm as a site of "rolling green hills and the cows grazing quietly in the pasture…taking note of the humble

nature of our small farm" (30). Labeling opponents may have been attempting to use this type of frame to resonate with members of the local food movement and connect with audiences of the state labeling movements as well, since many small organic farmers were a significant base of grassroots membership and mobilization for the state labeling campaigns (Clark et al. 2014).

Conclusion

By looking at the policy process through the analysis of frames within congressional hearings, we can observe policy development through a "behind the scenes" perspective that illuminates information legislators draw upon to make a policy decision. As committee hearings are considered the "principal vehicle for gathering and analyzing information" in the U.S. Congress (Arnold 1990: 85), analysis of the frames utilized in these hearings provided an in-depth look at the strategic discourses employed to influence the policy process. The passage of the federal labeling bill in 2016 by Congress demonstrates the power of numerous small-scale movements to scale up to the federal level. As evidenced through various education, environmental and health care reform policies, changes adopted at the state level can propel or expedite changes at the federal level (Clark et al. 2014; Wohlers 2013). The consumer right to know frame was a successful collective action frame for change at the state level and was strategically utilized at a larger scale in hopes of similar success. The consumer right to know frame was also able to undermine the depoliticizing frames that proponents of GMOs and defenders of the status quo had used in the past and forced them to adopt new frames to address socio-economic issues. Therefore in this federal policy debate about biotechnology, socio-economic concerns (consumer information, economic impacts on farmers and businesses, consumer confusion) became a central point of contention within the halls of Congress.

However, does the passage of S.764 truly "change the rules of the game" in considering socio-economic issues in biotechnology regulation? The new law mandates a uniform federal standard for the labeling of GM foods through a variety of options (text, QR code, symbol). The rhetoric of this law is to provide more information to consumers in a variety of ways to allow them to make better-informed decisions. Supporters of GMO labeling have already become wary of the idealized promises from this bill, as multiple ways of labeling may confuse consumers and discriminate against those who do not own smartphones or have access to broadband internet service. Activist groups that were involved in the state labeling initiatives are disappointed and frustrated with this federal outcome. Food and Water Watch, an environmental organization based out of New York described how the federal bill "undermines consumer choice" and "rolls back democracy" (Fried 2016). The Vermont Attorney General Bill Sorrell called it a "very industry-friendly proposal" and "a joke" (Bradley 2016). For state labeling activists, this was not the federal solution they were hoping for. While the consumer rights frame may have been used effectively by GMO opponents to award a federal GMO label, GMO proponents' use of frames focused on the need for uniformity in labels and economic risks with *state* labels may have also been effective to warrant the inclusion of preemption on the federal bill. This particular clause in the federal bill preempts any states from passing their own GMO labeling laws or outlaws any already passed (i.e. Vermont). Therefore, the federal law appears to have the dual intention of requiring uniform labels while simultaneously stopping future passage of state labeling laws.

Furthermore, standards for this labeling law have yet to be written so it is unclear exactly which foods will carry the label. While socio-economic concerns were referenced more often in these congressional hearings, the majority of these concerns were centered around an individualized consumer right to know rather than collective consumer or farmer welfare. Will

any of these additional socio-economic welfare concerns (while referenced more often in later sessions of Congress but still were not the majority) be embedded within the standards for the GMO label? Many activists in the movement are concerned with corporate power tied to G crops, the diminishment of the small family farm, and the environmental risks with increased herbicide and pesticide use associated with herbicide-resistant GMOs. However not *all* GM crops on the market (and future ones in development) are tied to large corporations or result in increases in herbicides or pesticides sprayed. For example, the GM Hawaiian papaya was developed by public sector scientists to resist the papaya ringspot virus, which destroyed the lucrative crop industry in the late 1990s and early 2000s but has since recovered tremendously (Voosen 2011). While these types of public-sector GM crops are the minority of GM crop production currently in the U.S., similar public-sector projects focused on developing more nutritious and productive crops are in the pipeline globally (Hoffman 2016). Would these types of GM crops receive the same label as Monsanto-owned, herbicide-resistant corn? While values-based standards have become prominent to differentiate products and develop alternative markets (Bartley et al. 2015; Dupuis and Gillon 2009), standards will usually incorporate more technical, scientific language under the guise of easier compliance (especially for larger industries) (Timmermans and Epstein 2010; Guthman 2003; Hess 2007; Jaffee and Howard 2010; Jaffee 2012). This is evident in the organic movement where originally organic standards were meant to reflect ecological farming techniques such as crop rotation, biological pest control or composting. However, with larger industries wishing to bear the label, the organic standard changed to referencing a list of allowable, restricted and prohibited inputs (Guthman 2003). This discrete definition allowed many, larger industries to enter into the market achieving the lowest common denominator of organic production requirements and less commitment to the full range

of ecological farming techniques that were originally espoused at the beginning of the organic movement (Hess 2007; Szasz 2007; Guthman 2003). Can the standards for a GM label take into account the social, economic and environmental concerns voiced throughout these biotechnology debates?

This trend toward reliance on technical scientific standards has been observed in the Non-GMO Project, the third-party certification label which bases its standards on thresholds from genetic testing to observe the percentage of GM DNA contained in the food product. Under the guise of transparency and accountability, the Non-GMO Project legitimizes its standard through testable technoscientific norms while the organic industry has criticized these standards for undermining the holistic environmental practices reflected in the organic label (Bain and Selfa 2017). Moore et al. (2011) state, "Operating within a framework of scientistic regulation can result in policy changes advocated by activists but it can also mean accepting a narrowly defined basis for technology regulation…the strategy can unintentionally contribute to scientiziation" (524). The neoliberalization in the food and agriculture sector appears to limit the strategies and goals of activist groups to those that favor continued neoliberalization of the food industry such as those promoting individualized shopping practices. However activist groups did not only cite consumer right to know issues in their testimony against GMOs. Activists cited environmental, sustainability, human health and socio-economic risks with the use of GMOs, none of which may be addressed with the new labeling law. Future scholarship should examine the standards of S.764, the prominent players writing the standards, and which features of GM crops are considered in the label.

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Chapter 3: Local Frames, Local Success: Case Studies of Genetically Modified Organism (GMO) Labeling Initiatives in the Northeast, US.

Abstract

The introduction of biotechnology into the food system through genetically modified organisms (GMOs) has ignited fierce debate about the moral, ethical and safety issues behind the application of this technology. Critics of the technology and a concerned public, have called for a mandatory GMO label on all food products. While a U.S. federal labeling bill was stagnant in Congress, initiatives for GMO labeling emerged throughout the U.S. on a state-by-state basis. In this paper, I examine state specific case studies in the Northeast including Vermont, Connecticut, Maine, Massachusetts and New York, where there has been a range of activity surrounding the formation of GMO labeling policy. I take a mixed-methods approach, combining interviews with key informants and content analysis of oral testimony from statewide public hearings to gain an understanding of the ways in which various stakeholders and the public frame the issue of GMOs and GMO labeling in their specific state. I examine framings, that is, ways in which individuals formulate arguments to convey specific meanings, to identify connections between types of framing and success in passage of a labeling law. Results indicate that frames focused on civic agriculture in Vermont enhanced community solidarity and led to more effective strategies in the state to pass a GMO labeling law. Framings tied to state socio-economic concerns may resonate within the community most effectively to advance small-scale progressive policy change.

Introduction

Genetically modified organisms (GMOs) or food produced with genetic engineering (GE) have become contentious for the social, economic, cultural, environmental and health implications they encompass. The biotechnology industry, as well as some scientists and farmers proclaim the many benefits of biotechnology, such as labor efficiencies for farmers (field-wide spraying rather than weed-by-weed efforts), decreases in pesticide use, and the potential to feed an ever-growing population in a changing climate (drought-resistant, disease-resistant, and nutritionally-enhanced crops, etc.) (Saletan 2015; NAS 2016; Asis 2017; Curchoe 2017). However, opponents contend that GMOs in fact increase herbicide/pesticide use, lack a body of independent scientific research verifying safety, contribute to loss of cultural traditions, further concentrate the role of corporations in the agricultural sector, erode farmer agency and contribute

to weed and pest resistance thus increasing the use of evermore toxic chemicals (Benbrook 2012; Kaur et al. 2013; Thompson 2014; Consumer Reports 2015; Cassidy 2016; FOE 2017).

Public sentiment surrounding GMOs has also remained skeptical. According to a poll conducted in 2016, 52% of the public believe GMOs are unsafe and 93% of the public believe the government should require the labeling of GMOs (ABC 2016). Due to the public's uncertainty and distrust towards the proclaimed benefits of GMOs and a lack of movement in the legislative or regulatory domains for GMO moratoriums or bans (Walsh-Dilley 2009; Pechlaner 2012), state initiatives emerged in the early 2010s to address the need to label foods containing GMOs or produced through GE. Early movements in the West (California, Oregon, Washington, Colorado) saw limited success with ballot referendums to label GMOs, failing by relatively close margins. However, the labeling movement began to see some success in legislative campaigns in the Northeast following the partial passage of labeling bills in Connecticut and Maine and full passage in Vermont in 2014. As these Northeast states provide a unique set of case studies in which to examine the mixed outcomes of success, failure, and stagnation in GMO labeling legislation, I look at the labeling initiatives in Connecticut, Maine, Massachusetts, New York and Vermont. Using a frame-analysis approach, I examine the discourses used by the public and stakeholders involved in GMO labeling initiatives to understand how labeling activists and opponents are framing the issue of GMOs and GMO labeling and what types of frames in each policy-making arena led to policy change or stagnation. I apply a mixed-methods approach, combining content analysis of over 700 pieces of public testimony from the state-wide hearings on the issue of GMO labeling, supplemented by fifty-six interviews with diverse stakeholders (environmental groups, consumer advocacy organizations, farmer advocacy groups, biotechnology representatives, state legislators, and the food industry) involved in the state

labeling debates. Together this data set is used to explore how GMOs are framed across these different states, which frames resonate with the public, and if different frames led to distinct outcomes in terms of statewide labeling policies.

In this paper, I argue that Vermont's ability to utilize frames focused on the state's agricultural identity and maintaining the viability of its "civic agriculture" was an effective strategy for enactment of a GMO labeling bill. Lyson (2004) coined the term "civic agriculture" to describe locally based food production "tightly linked to a community's social and economic development" and "characterized by networks of producers who are bound together by place" (1, 63). Civic agriculture can be manifested in farmer markets, community supported agriculture (CSA) programs, community gardens, food co-ops, food hubs or "pick your own" operations. A key feature of civic agriculture is the opportunity for community embeddedness within agriculture and food production (Hinrichs 2000; Jacques and Collins 2003; Schnell 2007). In a time of greater uncoupled production and consumption in agricultural production, civic agriculture provides the opportunity for "forums where producers and consumers can come together to solidify bonds of local identity and solidarity" (Lyson 2004: 7). Therefore, frames focused on Vermont's unique social and agricultural identity tied to its small farms and community based livelihoods, ultimately created a "gap or conflict discourse" of Vermonters versus GMO agriculture (Walgrave and Manseens 2005: 122) that resonated well within the state. While the four other states in this study reflect varying levels or characteristics of civic agriculture, activists for labeling did not as readily draw upon these frames in their arguments for a GMO label, instead focusing on the widespread and more mainstream frames of a consumer right to know and public health risks. I explore why these frames may not have resonated as well with state legislators to enact additional state labeling laws. This paper is organized as follows.

In the next section, I discuss the analytical framework that guided my methods and data collection, followed by an overview of frames used in the biotechnology debates. I then give a summary of past state labeling initiatives followed by a description of the methods I employed, and the analysis of public testimony and interviews. Drawing upon my data, I illustrate how Vermont's distinctive use of frames focused on alternative, sustainable agriculture in their state and the threat of GM corporate power on their democratic rights helped personalize the issue of GM agriculture in the state, thus leading to the passage of a state GMO labeling bill. In the final sections, I discuss my conclusions and the implications for the future of GMO labeling in the context of a new federal labeling law.

Framing and Policy Development

Political actors, including advocacy organizations, legislators, environmental groups and interest groups, attempt to recruit members of the public to favor a particular policy decision over alternatives by creating messages or narratives. When political actors believe that a policy change is necessary they may attempt to frame the issue by trying "to raise the salience of a particular aspect of a problem or of a particular solution to the problem" (Baumgartner et al., 2009, 167). If political actors are able to identify a new or different definition of the problem (i.e. frame the issue in a new or different way), it may help to justify a different solution to the problem (Baumgartner and Jones, 2009; Baumgartner et al. 2009). Frames can be defined as "mentally stored clusters of ideas that guide individuals' processing of information" (Entman 1993; 53) and serve as interpretive frameworks that allow people to make sense of a situation (Goffman 1974). Research has shown how social movements will frame issues to effect motivation to mobilize (Feindt and Netherwood 2011). Successful frames must not only identify

the problem and solutions but specifically must *resonate* with people to motivate them to act (Tarrow 1994; Johnston and Noakes 2005). Frames that successfully resonate with the masses and motivate them to act can be referred to as "collective action frames" (Benford and Snow 2000). Collective action frames are "action-oriented beliefs and meanings that inspire and legitimate the activities and campaigns of a social movement organization" (Benford and Snow 2000, 614). In social movement research, collective action frames are of interest because they must be powerful and influential enough to motivate individuals to act in opposition to elitist frames expressed by authoritative actors that usually reinforce the status quo (Noakes 2005). One area of particular interest for this study is the creation and strength of "master frames," defined by Snow and Benford (1992) as collective action frames at a much larger scale that are able to resonate with broader audiences. If a master frame is more inclusive then it can appeal to a much wider audience. They write, "We assume that the more central the ideas and meanings of a proffered framing to the ideology of the targets of mobilization, the greater its hierarchical salience within that larger belief system and the greater its 'narrative fidelity'" (141). For example, food security and sustainability frames have been identified as "master frames" or "consensus frames" because of their ability to unite wide-ranging groups and interests in social movements, as have the frames of individualism, anti-statism, and localism (Mooney and Hunt 2009; Kessler et al. 2016; Rahn et al. 2016). When an issue is able to resonate with a broad audience, irrespective of context in time or place, it may have a greater likelihood of remaining on the political agenda and lead to mobilization or action.

Framing is a process also utilized by powerful actors to maintain their hegemonic positions (Maeseele 2010), considered "official frames" (Noakes 2005). While "official frames" usually enjoy a privileged position of acceptance among legislators or decision makers due to

greater control over financial or authoritative resources (Giddens 1987; Noakes 2005) and "familiarity is more likely to breed acceptance than contempt" (Noakes 2005: 12), construction of an official frame does not guarantee success if the frame does not resonate with the cultural values and beliefs of the public (Noakes 2005). Therefore, in evaluating the trajectory of any social movement or policy change, it is important to evaluate powerful actors' "official frames". In the GMO labeling debates were these "official frames" able to maintain their privileged position of acceptance among legislators and the public, or were opponent activists able to garner enough public support to upend the status quo and pursue their respective policy goals?

In the social movement and policy change literature, past studies have shown that stakeholders identifying multiple frames to explain a problem or highlight a solution increases the likelihood of successfully resonating with the public. Rahn et al. (2016) found that supporters of raw-milk sale legalization in the U.S. drew upon multiple frames to gain widespread support including health benefits, personal freedom, anti-big government regulation and support of local food. Haydu (2012) used the term "frame brokerage" to demonstrate how broad coalitions accommodating diverse framing help translate movement goals into the languages of different audiences and can help draw them to action based on the identity and mission of that particular group. Utilizing multiple, integrative frames can provide a multidimensional "package" of frames that can appeal to a wider audience (Baumgartner et al. 2009; Haydu 2012; Mondou et al. 2014) rather than diluting messages that become too broad and ineffective.

This study's comparative analysis connecting different framings to policy change explores a novel phenomenon that adds to social movement and policy studies literatures. Science communication research has looked at the effect of framings, particularly in climate change communication, on the public's climate-related beliefs, concerns and behavior, but not

necessarily on the passage or failure of a particular climate change policy (Akerlof et al. 2010; Myers et al. 2012; McComas et al. 2015). Since minimal research has been conducted on movement actors' frames and the frames available to them through stakeholder groups (Steinberg 1998), this research helps fill that gap by identifying major stakeholder frames through interviews as well popular frames utilized by the public through public testimony. And while it may be difficult to identify distinct social movement outcomes (Diani 1997), Lubitow (2013) found that focusing on particular campaigns and policy outcomes can help to understand the influence of a movement. Therefore, my unique case studies in the Northeast can be scaled up to help understand the larger social movement for GMO labeling across the United States. Looking at public testimony data allows us to evaluate the resonance of particular frames for the public as well as the effect of different frames on distinct policy developments across states.

Frames Utilized in the Biotechnology Debate: Let's Give Them Something to Talk About

With the advent of biotechnology in the 1980s, many scientists and the biotechnology industry framed the technology as a "win-win" approach to fulfilling current and future social, agricultural, human health and environmental needs. Biotech proponents believed that transgenic crops would address present and future moral and environmental problems such as global hunger from increasing population levels, scarce resources, a changing climate, and rising food prices (Paarlberg 2000; Herring 2007; Mooney and Hunt 2009; Glover 2010; Schurman and Munro 2010; Dibden et al. 2013; Motta 2015). Biotechnology in agriculture was portrayed by proponents as a quick technological fix for environmental, social, economic and nutritional problems without any tradeoffs to be found. Individuals wary or unaccepting of this technology

were deemed Luddites who threatened future U.S. innovation and leadership (Maeseele 2010; Schurman and Munro 2010).

On the other side of the debate, those individuals first concerned with the overly zealous acceptance and global commercialization of the technology referenced the global north's ill-informed domination on the global south, citing past mistakes of the Green Revolution and thus dubbing this the Gene Revolution (Stone 2002a; Buttel 2005; Schurman and Munro 2010). Critics contended that the adoption of GM crops in the global south drastically altered rural communities and livelihoods, reducing jobs for rural inhabitants and switching land ownership and control to biotech companies, thus uprooting residents to migrate to urban areas (Scharper and Cunningham 2006; Leguizamon 2014). Anti-biotechnology activists also emphasized the "unnatural" practice of inserting genes into plants, "playing God", the environmental risks (loss of biodiversity, genetic contamination, etc.), and unknown human health risks (Buttel 2005; McKibben 2003; Motta 2015).

Some activist organizations have strategically linked GM crops to the negative implications of conventional, industrial agriculture, thus emphasizing the threat GM crops pose to local socially embedded agricultural production (i.e. civic agriculture). In her study of anti-GMO campaigns in Mendocino County, California, Walsh-Dilley (2009) showed how activists successfully banned the propagation of GMOs by framing them as a *social* threat to the community's economy and livelihood. Since the majority of agriculture in this county is organic, community members were specifically concerned about GM crops contaminating their organic crops. With agricultural production tied so directly to the community, contamination was not only an environmental concern but an economic and social one. In Mendocino County, the issue also became one of "biodemocracy" due to big business threatening the desires of the people

(Pechlaner 2011). Similar strategies and outcomes occurred in Europe as well, where "GMO-free" zones were established after GM crops were framed as a contamination threat to other types of farming, specifically to organic and sustainable farming and to the region's rural development (Levidow and Boschert 2008). While the agricultural biotech industry attempted to promote a discourse where GM crops could "coexist" with sustainable agriculture, environmental non-governmental organizations (NGOs) stigmatized them as contaminants. With a rural area's economic development tied directly to their sustainable and/or organic agriculture, the threat of contamination by GM crops was not only a physical threat, but also "local environments were framed as cultural-economic assets under threat from GMOs" (Levidow and Boschert 2008: 18).

While biotechnology proponents have attempted to frame GMOs as a sustainable solution to growing populations and diminishing natural resources (especially arable land and water) (Asis 2017; Curchoe 2017) other authors have contended that GM crops address only technical sustainability aspects in agricultural production (environmental and economic), but do not address social equity and participatory aspects (democratic participation and/or decision-making) inherent in the concept of sustainability (Ervin et al. 2010). As GMO regulatory requirements (crop moratoriums, required safety testing, and incorporation in trade laws) failed to gain momentum in policy development, activists turned to required labeling of GM products as a way to control the spread of the technology (Schurman and Munro 2010; Wohlers 2013; Bain and Dandachi 2014). Within a "neoliberalizing" activism landscape, in which activists focus on reforming the agricultural market through individual consumption patterns rather than government-mandated policy, social movements were focused on ways to enhance consumer power in addressing problems in the agri-food system (Bain and Dandachi 2014). Beginning in

the early 2010s, a collection of states and counties on the West coast began introducing GMO labeling bills on to the legislative agenda. The issue of genetic modification of food transformed into a consumer "right to know" issue replete with slogans like "informed decision", "consumer choice" and "transparency in the food system" (Caswell 2000; Klintman 2002; Bain and Dandachi 2014).

GMO Labeling at the State Level

The issue of GMO labeling at the state level gained national attention when Proposition 37 was introduced as a referendum ballot measure in California in 2012. While it failed 53% to 47%, it led to a cascade of other ballot referenda across the West including Washington Initiative 522 in 2013, Oregon Measure 92 and a Colorado measure in 2014 (Westervelt 2012; Weise 2013; Runyon 2014). All the ballot measures failed by relatively narrow margins, but continued to propel the movement forward with increased information and resource sharing across the county (Clark et al. 2014).

In the Northeastern U.S., Connecticut was the first state to pass a statewide GMO labeling law in 2013, however it came with a contingency provision. That is, attached to Connecticut's labeling law was a "trigger clause" which required four other states to enact labeling laws--one must border said state, and the combined population of all states must total more than 20 million (Wilson 2014). Maine followed with a passage of a state labeling law with a similar trigger clause attached in 2014. While these states' laws remained stagnant, relying on other state initiatives to act, Vermont became the only state in the country to pass a labeling law without a trigger clause, with an effective date of July 1, 2016. However, as a small state with a population of only 626,562 citizens, Vermont could not fulfill Connecticut's and Maine's trigger

clauses. States such as New York and Massachusetts (with populations of 19.75 and 6.75 million respectively) could set in motion the enactment of Connecticut and Maine's state labeling laws. Both New York and Massachusetts were active in labeling campaigns with several bills introduced over multiple sessions, public hearings held on the issue, and demonstrations or rallies within the state. However, neither was able to get a bill enacted before the federal labeling law S.764, The Biotech Labeling Solutions Act, passed in July 2016, preempted all current and future state labeling bills. This unique mix of success, failure, stagnation and interdependency in state policy in the Northeast provides a rich set of case studies to examine labeling discourse and policy development within and across states.

Methods

Public Testimony

I analyzed written and oral testimony from statewide hearings in the Northeastern states related to a statewide GMO labeling bill. Public hearing testimony was available via the state government websites for Connecticut and Maine. Public hearing testimony from Massachusetts was requested via their state government archive office as text. Vermont public hearing testimony was requested via the state government archive office as audio files, which were then transcribed. Connecticut testimony was collected for the years of 2012 and 2013 (as the state held two different hearings related to GMO labeling) with a total of 242 individual testimonies, which comprised 34% of total testimony data. Maine testimony was collected for the year 2013 with a total of 78 testimonies, comprising 11% of total data. Massachusetts testimony was collected from 2015 with a total of 230 testimonies, comprising 33% of total data. Lastly Vermont testimony data was collected for their two public hearings on GMO labeling bills in

2012 and 2014 with a total of 153 testimonies, comprising 22% of total data. The testimonies, which are deemed public records, include the name and town association for each witness. New York held a public hearing in 2013 but the data were excluded from analysis since the hearing had a very distinctive format, in that it only contained testimonies from 14 expert witnesses who were invited to speak on the issue of GMO labeling and contained no public or citizen testimony.

Initially testimony was categorized into support or opposition for a label, and further categorized into four groups based on group identity: (1) non-governmental organization (NGO), (2) citizen, (3) industry, (4) government legislator. Content analysis was conducted on each piece of testimony within each state hearing (Neuendorf 2001; Liu et al. 2015). Each piece of testimony was analyzed by first reading through the data and performing open coding. After initial coding, focused coding was performed to identify the most emergent categories and develop a codebook (Creswell 2013; Emerson et al. 2013; Charmaz 2014). Coding was conducted with the qualitative data software program *Atlas.ti*. Testimonies were coded based on how individuals were identifying (non)-problems of GMOs and the (non)-solution of a GMO label. The emerging codebook grouped codes into four main categories: 1) Risks or benefits of GMOs, 2) Rationale for opposition/support with GMOs, 3) Perspectives specific to the labeling of GMOs including risks of a label, benefits of a label and rationalizations for why a label was (un)necessary, and 4) Proposed solutions in terms of continued support or opposition to GMOs. The entire coding scheme is included in Appendix G. The presence of a topic was coded as 1 and the absence or no mention as 0. Descriptive statistics were performed to indicate the frequency of certain risks identified by the testimonies and offered a glimpse into the main frames utilized by the public and stakeholders in the GMO labeling debates.

Interviews

Confidential semi-structured interviews were also conducted with 56 individuals active in the statewide (CT, MA, ME, NY, VT) GMO labeling initiatives including state legislators, farmers, and representatives of environmental groups, farmer groups, biotech industry, food industry and consumer rights organizations. All interviews were confidential and were assigned pseudonyms for purposes of presenting findings in this study (See Appendix C for complete list of interviews). Questions pertained to identifying the (non)-risks of GMOs, why these individuals/organizations supported or opposed labeling and their perspectives on a federal or state-mandated label. A standard interview protocol was used for all interviewees with slight modification for activist organizations and trade associations. Supplemental questions for activist and trade groups included if they formed any partnerships with other organizations within and across states, the main audience they represented and how they incited action or recruitment among members. Interviews took place between May 2015 and August 2017. Interviews were conducted in-person or by telephone. All interviews were recorded with permission from the participants, transcribed verbatim, given an identifier code and coded using the same methods used for coding public testimony data.

Results

Public Testimony Summary

The coding scheme and data are organized by the four main categories, broken down by overarching frames and specifically into sub-codes in percentages, divided by state (See Appendix G). Table 1 lists the distribution of public testimony statements by affiliation. The overwhelming majority of testimony was in support of a GMO labeling bill (94.9%).

Table 2.1 Distribution of public hearing testimony statements (CT, ME, VT, MA) by affiliation

Citizens	625
NGOs	40
Industry (biotech and food)	29
Government representatives	9

Interview Data Summary

The distribution of individual interviewees is depicted in Table 2 (See Appendix C for complete list of interviewee codes with state and/or national association and stance on labeling).

Table 3.2 Number and distribution of interviewees by stance and affiliation

Proponents of labeling	**34**
Farmer advocacy	11
Legislators	8
Consumer advocacy	5
Environmental advocacy	5
GMO labeling advocacy	4
Law clinic	1
Opponents of labeling	**16**
Biotechnology industry	6
Food industry	5
Farmer advocacy	4
Science advocacy	1
Neutral	**6**
Food industry	4
Third party certification	1
Science advocacy	1

Support for Label

Consumer Rights

I identified in both testimony and interview data that the main reason proponents called for a label was the "consumer's right to know". The consumer rights frame was the most popular frame referenced in public testimony data across all four states (Table 3). Witnesses reasoned that consumers needed this information so they could make informed decisions within the marketplace. Joey, from Massachusetts stated, "I, and all Massachusetts residents deserve the

right to make informed decisions about the food we purchase…Consumers should be allowed to decide for themselves what purchases they make and what foods they consume" (Hearing on H.3242 2015). Interviewees similarly identified GMO labeling as a "right to know" issue that emphasized the principles of full disclosure, transparency, and dissemination of information. Ellen, a representative from an New York environmental organization stated:

> We felt from a consumer perspective, this was really a consumer right to know issue. People want to know what they're eating. They have a right to know….I think for a long time consumers have thought that when something is on the store shelf, it has been tested, it has been thoroughly vetted and it is safe. And I think more people are waking up and realizing that's not true…I think more and more people are becoming enlightened consumers and there is this desire to know what they are putting in their bodies (GMO 123).

Many stakeholders stated that companies should be forthcoming about all information surrounding a food product and any limitation on this access to knowledge was a direct affront to consumers' abilities and rights to make a decision.

Table 3.3 Most frequently cited frames in support of labels in public testimony within and across four states

Connecticut	**Maine**	**Massachusetts**	**Vermont**	**Total**
Consumer Rights	Consumer Rights	Consumer Rights	Consumer Rights	Consumer Rights
Lack of Independent Scientific Data	Lack of Independent Scientific Data	GMO Human Health Risk	Democratic Right	GMO Human Health Risk
GMO Human Health Risk	GMO Human Health Risk	GMO Corporate Power Risk	GMO Corporate Power Risk	Lack of Independent Scientific Data

GMOs and Human Health Risks

Within the public testimony, the potential human health risks caused by GMOs was a popular frame across the states as well (Table 3). Citizens expressed concerns about all different kinds of diseases that could be related or caused by consuming GM foods. Across public

testimony GM foods were associated with infertility (Whitney Hearing on H.B.6519 2013), cancer (Patricia Hearing on H.3242 2015), increased allergies (Sue Hearing on H.722 2012) and attention deficit disorders (Kelly Hearing on H.3242 2015). Many citizens cited independent studies that showed negative health effects from GM crops such as mammalian damage to the kidney, liver and bone marrow (Michael Hearing on H.B.6519 2013). Interviews with stakeholders across the states and nationally did not reference health concerns as readily as public testimony, but Eli, a representative from a Massachusetts organic farming advocacy group mentioned "all kinds of inflammatory issues, allergies, and autism, and a lot of other things that have been associated with it" (GMO 110). Some interviewees and a collection of public testimony witnesses discussed the risk of health problems with the increased use of herbicides and pesticides associated with the planting of GM crops. Brenda from Massachusetts described GMO foods as "poison" that is "full of glyphosate, a carcinogen, and even more toxic pesticides. Breast milk contains it. Male hormones are damaged by it. We cannot avoid this poison unless we know where it is" (Hearing on H.3242 2015).

GMO Risk of Corporate Power

In interviews with stakeholders fighting for GMO labeling, many organizations across the states were concerned about the power that companies producing GMOs held over the public and farmers specifically. Bob, a farmer from Maine described biotech companies as "self-interested corporations whose motivation is profit and they don't care about human health or human rights" (GMO 115). To many of these groups GMOs were inherently tied to corporate domination that undermined and threatened democracy, the public's access to information, as well as human and environmental health. The corporate power frame also made references to industries' ties to "this

chemical corporate controlled government" (Bob, GMO 115) and the subsequent threat to democracy. In public testimony, Vermont and Massachusetts citizens prominently cited concerns with GMOs linked to corporate power (Table 3). Ben from Vermont stated, "The voice of the people is being drowned out by the corporate cash who is coming into our government" (Hearing on H.112 2014). Bob seconded that sentiment describing a family member who fought and died in World War II:

> He did not go down so that Monsanto could screw us over as a society and that is exactly what we're having to face. This is not what we have worked for 250 years; developing an imperfect democracy so these corporations could trample us (GMO 115).

There was an overall sentiment that corporations and the government were interlinked and the regulatory structure in charge of overseeing current GM crops on the market and approving new crops was corrupted or held captive by industry. Bob, the same farmer from Maine stated:

> The USDA…they are a captive agency which serves industrial agriculture and screws any family farmer that wants to be able to farm on their land...The problem is you have corruption in the three branches of government… Monsanto has got all of those in their hip pocket. So to try to do anything through normal government procedures does not look too promising. So enter the idea of GMO labeling (GMO 115).

According to these interviewees, because these large industries held power over information access for the public and safety regulatory procedures by the government, then the only solution was for the government to at least *require* companies to provide information via a label. That would then put the power back into the public (more specifically the consumer) to decide how they wanted to act upon this information. If the government was not going to look out for the wellbeing of the public then it was necessary to require a label so individuals could decide on their own if they wanted to purchase a product produced through genetic engineering.

Lack of Independent Scientific Data

The lack of trust in the corporations producing the products and conducting the studies proclaiming their safety ties in directly with another popular frame among interviewee supporters of GMO labeling: The lack of and therefore need for more scientific studies on the environmental, human and animal health effects of GMOs. Paul, a representative of an environmental organization stated, "…without independent long-term human health studies, we just don't know enough. And in the absence of that, how can you be excited about it?" (GMO 122*)*. Since there was an absence of independent studies, interviewees stated that at the least GMOs should be labeled so that 1) consumers could avoid them if they were wary and 2) independent scientists *could* start testing differences between these products now that they would be labeled for the general public. This was another prominent frame cited in the public testimony as well (Table 3). Ethel from Connecticut states, "I find it shocking that these GMO foods have been approved for public consumption without any rigorous testing for safety or long-term effects and are sold to the public without letting the public know that these foods have been genetically altered" (Hearing on H.B.5117 2012). Many citizens from the hearings called on the government to require more testing before blindly approving these products, invoking the concept of the precautionary principle prevalent in many European countries specifically concerning GMOs.

Opposition to Label

Consumers Rights

Labeling opponents agreed with the importance of upholding consumer rights and providing information to consumers. However, interviewees and public testimony witnesses

stated that GMO labels would only be *more* confusing to customers, would in fact provide them with *less* choices in the marketplace and would be unnecessary because an organic label already exists (Table 4). Industries discussed how this labeling law would ironically place an added burden on the consumer (limiting choice) that proponents of the bill argued a labeling bill would enhance (ability to choose). A spokesperson for the Massachusetts Food Association testified:

> consumers may see a decline in the number of products that they are used to choosing from when purchasing groceries, because manufacturers may choose to take their products off the store shelves in Massachusetts rather than have to go through a complicated scientific process to prove or disprove that their products are free from genetically modified organisms (Hearing on H.3242 2015).

Many interviewees also stressed the importance of providing *accurate* information to consumers. In their views, a GMO label would not be providing any actual helpful or accurate information. Jennifer, a crop industry representative stated:

> To me if you have a label on a product, produced with GE food or GM ingredients, it doesn't tell you a whole lot. It doesn't tell you what crop it was, what the gene did, was it an herbicide tolerant gene, was it insecticidal for yield benefits… (GMO 145).

Many labeling opponents emphasized that the GE issue was so complicated that the complexity could not be addressed with a one-line statement. Therefore, when asked about the recent passage of the federal labeling bill, many opponents to statewide GMO labels endorsed the potential benefits of the federal bill through QR code labeling (which allows customers to scan the product with their mobile device, directing them to a webpage with additional information on the product). Carson from a national science advocacy organization stated:

> What this QR code does, it allows the people who are making and selling these different foods, allows them to have more direct in-depth conversations with the customer or potential customer where they can actually have it lead to a page and say our sugar comes from GMOs and here's why. Here's an interview with a farmer

> who says why they use it and why they're buying it from them. And now there's a lot more information you can get and they can get some of those nuances that a 'contains GMOs' doesn't really tell you (GMO 146).

For GMO proponents, there was a bigger story they wanted to tell-- a more complete picture of the benefits associated with GMOs. A simple two- or three-word label would not adequately provide the information consumers so adamantly called for.

Economic Risks with a Label

Another popular frame utilized by opponent stakeholders (Table 4) was the economic risks with a GMO label. Rachel, a statewide grocery and retailer representative highlighted the major economic disadvantages her statewide companies would face with the addition of a state label. She states:

> I would say 98% of our value-added food producers needed products to move across state lines to stay in business. We just felt that it was unfair that they would be saddled with having to label their products differently than others outside the [state] market. And we also felt we are part of a regional marketplace and were very concerned about the isolation and the impacts of the business community (GMO 118).

Statewide opponents specifically emphasized how the companies most impacted by this labeling law would be the small, family-owned businesses, not necessarily the large conglomerate businesses and supermarkets.

Table 3.4 Most frequently cited frames in opposition to labels in public testimony within and across three states[4]

Connecticut	Maine	Massachusetts	Total
Economic Risks with Label	Consumer Rights Risks with Label	Consumer Rights Risks with Label	Economic Risks with Label
Consumer Rights Risks with a Label	Solution: No Changes Needed	Economic Risks with a Label	Consumer Rights Risks with Label
Solution: No Changes Needed	Economic Risks with Label	Solution: No Changes Needed	Solution: No Changes Needed

Differences Between States

The major outlier in terms of rationales and frames utilized in support of a GMO label was Vermont. In public testimony data, Vermont drew upon a broader array of rationales that other state witnesses did not reference as regularly. Over 20% of witness testimony referenced the benefits from agro-ecological and organic farming (compared to GM agriculture). They called upon legislators to stand up to the bullying industry (17.7%) and identified themselves as farmers, referencing their personal expertise in farming in the state (16.3%) (see Appendix G). Citizen witnesses testified that they were organic farmers themselves and feared that GM agriculture would undermine their preferred type of farming and livelihoods. Rick, an organic farmer from Vermont stated "My biggest fear concerning GMOs is that we are propelling our food supply into the future but our bodies and the natural environment are still in the present" (Hearing on H.112 2014). Joe stated "The reason I am an organic value-added producer is because I don't want to aid the proliferation of GMOs in the world. I am here in Vermont because I feel this is the safest place to pursue my passion and my dreams" (Hearing on H.722

[4] Vermont public hearings did not include any witnesses in opposition to GMO labeling.

2012). Vermonters explicitly called on their legislators to stand up to the bullying of corporations tied to GM agriculture and testified that a label was not only a *consumer* rights issue but a *democratic* rights issue. Paula testified:

> I have never encountered an issue that every single Vermonter wants. You [the legislators] have the means to stand up for us, against the power of the biotech industry…This is just a common sense, civil rights issue. We are depending on you and we will gratefully be here to back you up when you pass this bill. (Hearing on H.112 2014).

By describing the biotech industry as "bullying" legislators and vowing to stand with legislators in support when they pass this bill, in Vermont, there was a stronger sense of community opposition to the biotech industry and support for this bill. As Barry stated:

> We want you [legislators] to stand and make a firm stance, a committed stance and we will stand with you and we will not allow you to be bullied without us being bullied too. And by walking together, being together, we can have some ethical standards which will bring to the state of Vermont a huge thank you from the rest of America (Hearing on H.112 2014).

Stakeholders in Vermont made consistent reference to the promotion of sustainable agriculture within the state. Stakeholders and legislators stated that Vermont needed to focus on "regenerative agriculture" for the future of farming, not on biotechnology. Kate, a farmer advocacy group stated:

> The bulk of our farmers are small, diversified farmers that follow practices that are incredibly protective of the environment and quality of the food, and we believe in the face of all the other challenges out there with climate change, with economics, this type of farming is the methodology that is going to be sustainable over the long term and it's going to give us a sustainable food supply and it's also going to be give us the ability to maintain the economic viability of our planet (GMO 132).

Interviewees also stated how this sustainable agricultural heritage is engrained within the culture and values of Vermont. Vermont has "a culture and a citizenry that are incredibly engaged and

care a lot about their food and farming practices and where their food comes from and how it's produced" (Kate, GMO 132).

Members from other states' activist organizations confirmed this point as well about Vermont's citizenry, with Jessica, a member of a farmer advocacy group from Maine stating, "The culture of farming is well-within the fabric of their [Vermont's] society, much better than Maine" (GMO 114). For a citizenry so engaged and tied to agriculture in their state, GMO agriculture was considered a threat to this alternative type of farming (sustainable, regenerative). Because agricultural heritage is so tied to the community, GM agriculture could be seen as a distinct personal threat to the people of Vermont that legislators and the community would come together to fight against.

Discussion

Many scholars have critiqued the contemporary influence of neoliberalism, where market efficiency is of utmost importance and a self-regulating market will produce the most optimal social outcomes (McCarthy 2006; Guthman 2008; Rodrick 2011). Under the neoliberal paradigm, heightened hostility towards state intervention and regulation causes increased reliance on civil society to address and redress market failures (McCarthy 2006; Roff 2007; Rodrick 2011; Clapp 2012). Within the agri-food system in this era of neoliberalism, "politics of food" centers around how much knowledge consumers have on a food product, which will inform their purchasing decisions (Schweikhardt and Browne 2001; Goodman and DuPuis 2002; Guthman 2008), also deemed "politics via markets" (Lipschutz and Rowe 2005). Therefore a consumer rights frame resonates well with audiences wishing to have more control in the marketplace and greater participation in politics surrounding food. A new role emerges for these

"conscientious consumers" to purchase products with environmental or socio-economic characteristics they support such as Fair Trade certified, organic certification or "green" environmentally friendly products (Murdoch et al. 2000; Micheletti 2003; Soper 2004; Bostrom and Klintman 2008; Neilson 2010; Bartley et al. 2015) and relies on a company's accountability and transparency of information concerning their products (Mol 2015). Phrases such as "informed decision" and "freedom to choose" that reflect these consumer roles are evidenced in the testimony and interviews. Even opponents of labeling used the consumer rights frame by emphasizing that a label would *hurt* consumer rights by increasing consumer confusion and limiting consumer choice in the marketplace.

While the "consumer right to know" frame is by far the most popular frame utilized by labeling proponents, there are some limitations to this framing. Oliver and Johnston (2005) discuss how frames used in social movements are not meant to change anyone's beliefs but rather to optimize on existing beliefs, where "movement intellectuals perform the marketing task of packing their issue" to make it attractive and acceptable to the target public (195). Movement entrepreneurs will draw on symbols, rationales and themes found in the "cultural stock" of a target audience (Snow and Benford 1988; Naples 2002; Johnston and Noakes 2005). When frames overlap with the "cultural stock" of the members of society, they are considered "culturally potent" (Noakes 2005: 15). While individualism and freedom of choice can be considered "master frames" because of their ability to resonate with a broad audience (Snow and Benford 1992), they may not be culturally specific enough to warrant change or action at the state level. Vermont drew on specific frames related to their *state* culture and identity, which created a rhetoric or "gap discourse" between "the other" [GM industrial agriculture, biotech companies] versus "us" [small agriculture, VT community] (Walgrave and Manseens 2005).

Calling upon legislators to stand up to the powerful industry threatening to sue the state of Vermont creates another "us" versus "them" narrative. By creating a common enemy or villain in the biotech companies threatening the livelihood of Vermont farmers and the greater rural identity of Vermonters, a community of dissent rises against biotechnology and GM agriculture. While a policy for mandatory labeling will not directly block the influence of biotech companies or the planting of GM crops (as a ban or moratorium would), the way in which citizens and activists frame the problem of GMOs and the solution of a label, allows Vermont GMO opponents to associate passing a labeling law with rescuing their community from the threats of GM agriculture. Susan from Vermont stated, "Vermont is synonymous with quality alas GMO seeds end up harming soil quality, producing herbicide tolerant superweeds, increasing disease susceptibility in crops, disrupting ecosystems, reducing biodiversity. Vermont farmers deserve to know wherein lies their true economic security" (Hearing on H.112 2014). Another citizen, Judy states, "…it's time to look up and wake up before organic farming becomes a thing of the past. We must be constantly aware of what is going on in order to protect our assets and our wonderful heritage here in Vermont" (Hearing on H.112 2014). The GM labeling issue was consistently framed as an issue of sustainability, rights of farmers, economic security of the state and maintaining the overall rural and democratic identity Vermonters hold so dear.

So, What's so Unique about Vermont?

Hinrichs (1998) analyzed motivations for involvement in small-scale maple syrup production in Vermont and found that sugar making was tied to a rural identity deemed valuable despite the low, unstable income garnered through this regional enterprise. Working in maple syrup production helped establish, demonstrate and reinforce "regional rural identity" (524) tied

to a "cultural economy" (527). Other studies have found that motivating factors for small regional production include self-reliance, a physical challenge or the formation of a personal identity tied to nature (McGoodwin 1990; Fitchen 1991; Bliss and Flick 1994). Vermont's large amount of underdeveloped land has helped foster the economic vitality of rural recreation, tourism and direct marketing in the state's agri-food sector, thus helping maintain these rural identities many Vermonters embody (Hinrichs 1998; Albers 2000). The Council on the Future of Vermont (2009), a project conducted by the Vermont Council on Rural Development found through public forums, focus groups and public polls that Vermonters highly value the natural environment and the agrarian heritage of Vermont. Furthermore, they see the potential for multifunctional agricultural landscapes as the future of local food production in the region. Erickson et al. (2011) discovered overwhelming support from Vermont landowners in Chittenden County in enrolling part of their land in a cooperative land management program for local food production. Vermont has also enacted legislation to increase direct marketing in terms of food production and consumption in their Farm to Plate legislation passed in 2009, which outlined actions and goals to achieve greater local food consumption (Kahler et al. 2011). As such, Vermont exemplifies the tenets of civic agriculture by emphasizing local production and consumption embedded within the socio-economic vitality of the community.

Civic agriculture has also been found to enhance social capital, revitalize rural landscapes, improve environmental quality in an area and ultimately contribute to long-term sustainability efforts (Berry 1996). Orbach and Tobin (2014) found in their study on a community in New York State that members who engaged in civic agriculture through shopping at farmers' markets, patronizing local food retailers, and becoming members of CSAs led to higher levels of social and political engagement within the community. Those most engaged in

civic agriculture were most engaged in the community. And stronger community engagement can lead to greater political engagement as well. As Lyson (2004) states, "Civic agriculture flourishes in a democratic environment" (76). Since civic agriculture is tied to the economic and social development of the community, civic agriculture allows food consumers to be elevated to positions of food citizens where they are not only making decisions about which foods they wish to purchase but about the practices and regulations of companies that produce and process their food. Hence, representatives from Vermont not only stated that a GMO label was a consumer right but also a *democratic* right. Here citizens identify themselves as not only consumers, but as active citizens engaged in a democratic process. Emboldening the power of the citizen in policy discussions through participation, transparency and accountability enhances the democratic legitimacy within the policy process (Clapp and Fuchs 2009). Thus, Vermont citizens solidified their legitimacy in the local GMO labeling legislative debates, increasing their power and voice in the policy process.

What is interesting to note is that Vermont in fact is not the only state in this study to exhibit characteristics of civic agriculture. For example, Massachusetts contains the fourth highest number of farms in the U.S. (28.4%) that sell directly to the public (which has been used as a quantitative measure of civic agriculture, see Lyson and Guptill 2004), followed by Maine, Vermont and Connecticut (Table 5). Massachusetts has the highest percentage of farms that participate in CSAs and Vermont and Maine are the top two states with the highest percentage of organic farms in the nation (Table 5). Therefore, civic agriculture and organic farming are not characteristics unique to Vermont, but activists in other Northeastern states have not tied GMO labeling to their state farming, instead relying on "master frames" of individualism and consumer rights. When frames focus around agricultural embeddedness in the state economic sphere,

threats of corporate power become much more of a personal, direct threat on specific livelihoods rather than an ambiguous threat of large industrial cooptation.

Table 3.5 Select agricultural statistics from USDA Census of Agriculture, states included in study in bold (USDA 2012)

Rank in the US	% of farms that sell directly to the public	% of CSA member farms	% of organic farms
1st	Alaska (31.6)	**Massachusetts (5.6)**	**Vermont (9.0)**
2nd	New Hampshire (30.7)	Alaska (5.5)	**Maine (8.3)**
3rd	Rhode Island (30.2)	**Maine (5.0)**	New Hampshire (5.4)
4th	**Massachusetts (28.4)**	**Vermont (4.5)**	California (5.0)
5th	**Maine (28.3)**	Rhode Island (4.0)	Hawaii (3.7)
6th	**Vermont (28.2)**	New Hampshire (3.9)	**Massachusetts (3.6)**
7th	**Connecticut (23.8)**	**Connecticut (3.7)**	Alaska (3.4)
8th	Hawaii (23.0)	Hawaii (2.0)	**New York (3.2)**
9th	New Jersey (19.7)	**New York (1.63)**	Rhode Island (2.7)
10th	Oregon (18.8)	Nevada (1.62)	Washington (2.6)

The Power of the Local, Small-scale Frame

Framing the issue in terms of small-scale, state agricultural identity and economic embeddedness of statewide agriculture may also have been more effective in challenging the GMO labeling opponents' frames. In fact, GMO labeling opponents utilized frames focused on risks to their state's economy if a GMO labeling bill passed. They argued that state food manufacturers, producers, and retailers would suffer from higher costs due to segregating and labeling ingredients, costly lawsuits if they did not abide by the complicated rules, and deter future biotechnology infrastructure investment for the state. There was even fear that a labeling law would impede the state's access to food. Ann, a Connecticut legislator stated, "There were major food brands who were saying 'we can't just label what is in CT. We won't even send the food to you guys anymore' so then there was this big thing, 'oh we're not going to have food.'" (GMO 103). These opponents were just as successful in blocking a labeling law by focusing on the state-specific economic and social impacts if a labeling law was passed. By keeping the frames structured around local, state-specific effects (such as the future of economic

development and food access) opponents took control of the policy discourse on GMO labeling. Similar to the county level GMO bans in Mendocino County, California, "abstract concerns must be made relevant to local people in order to mobilize them" (Walsh-Dilley 2009:104). While "master frames" of individualism and public health resonated with the public across all states, framing the issue in terms of local benefits or risks appears to have resonated more with state legislators leading to policy change.

Conclusion

In this paper, I have drawn on frame analysis in policy studies to understand the trajectory of statewide GMO labeling laws in the Northeast. We see that Vermont's use of frames tied to small-scale, sustainable agriculture in the state and the democratic right to know created an effective discourse leading to the passage of a GMO labeling law. By coupling GM agriculture with large industrial agribusiness companies capable of exerting power and control over a state and/or community, proponents of labeling created an effective "gap discourse" of "us versus them" further strengthening community solidarity in the state. The small-town agriculture and local community frames created a powerful imagery capable of resonating with the public and legislators, that have been evidently powerful in driving other food policy debates (Rahn et al. 2016). In the GMO labeling debates, these frames proved to be more effective than public health risks or consumer right to know frames alone, which have been popular amongst the anti-biotechnology and GM labeling movements nationwide but may have lacked in local resonance and cultural compatibility in Vermont. In the other state case studies, frames concerning broad-based consumer rights and public health concerns were not strong enough to confront frames highlighting local socio-economic risks of adding labels to products. While the

master frames of consumer rights or public health may be successful in broad-based movements attempting to mobilize a wider group of people, I found that master frames focused on individualism, consumer rights and public health in fact did not affect state policy development. Rather, frames focused on local socio-economic impacts led to policy change.

However, discourse and framing strategies are not the only factors influencing policy development. The institutional venues available for the concerned public or interest groups to air their grievances may also influence if these concerns are even acknowledged and addressed (Jones and Baumgartner 2005; Baumgartner and Jones 2009; Kingdon 2011). In Vermont, interviewees highlighted the extremely accessible "citizen legislature" in the state. Joe, a Vermont farmer and prominent participant in the GMO labeling campaigns stated, "The legislators are in session about 4 ½ months every year…The cafeteria for the statehouse is open to the public…Very few states you can just go into the cafeteria and accost them. We're very lucky with that" (GMO 133). Beth, a VT legislator affirmed that point stating, "People know how to get ahold of me. We're very accessible. My home phone number is published…People know where I live…We are very in touch with our constituents and I think they realize that" (GMO 137). In contrast, a New York legislator talked about the immense lobbying effort by biotech companies to block the labeling bill in New York that had a major role in the bill not passing out of committees. She states, "There was a large role lobbyists played in opposing this bill and they shook some legislators' stand on it. They did all sorts of tricks to them off the bill, not get on the bill or not to vote for the bill" (GMO 126).

Despite other external factors at play, discourse and framing of problems and solutions still have a major influence in policy development, such as determining what issues arise on the political agenda (Stone 2002b; Kingdon 2011; Hayes 2013; Schneider 2013). This study

highlights the importance of framing in policy development, and through comparative analysis draws conclusions about which frames were used most prominently and effectively in state policy development, and how they aligned with the state policy's subsequent successes, stagnations and failures. Collective threats at a small scale – in this case – in terms of state identity or state socio-economic vitality, may have more potential to elicit state action rather than broad-based individualistic ambiguous threats. These findings suggest a greater likelihood of success when framing the scale of effects to the proposed scale of action. For future food movements focused on social justice, equitable distribution and sustainability, areas embodying a civic agricultural identity may be able to benefit from frames highlighting the importance of maintaining these identities to warrant political action in their favor. However, as the GMO labeling issue is now at the national scale given the passage of S.764, future studies can assess whether localized, place-based frames can be scaled-up to the national level to effect policy change or if they are present and only effective at the local small-scale level.

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Chapter 4: "We're a Feisty Little State": Understanding State Level Genetically Modified Organism (GMO) Labeling Policy Change with the Advocacy Coalition Framework

Abstract

In this article I apply the Advocacy Coalition Framework (ACF) with components of Resource Mobilization Theory (RMT) to analyze the initiatives in the Northeast around genetically modified organism (GMO) labeling to understand the diversity of policy outcomes across five states. I use a comparative case study approach to look at policy core beliefs across coalitions within and between states drawn from interviews with activists and legislators involved in each state's initiative. I also evaluate each coalition's political capacity and political opportunity structures to understand external factors which could influence a coalition's ability to pursue and achieve their policy goals. The results show that policy core beliefs among labeling activists and labeling opponents were relatively uniform across all states with the exception of Vermont whose coalition for labeling drew upon collective civic agricultural benefits with the addition of a GMO label. All states differed in their coalitions' political capacity and political opportunity structures. Vermont's citizen legislature, responsive legislators and absence of lobbyists created a favorable political environment for the grassroots labeling coalition's success.

Introduction

One of the most contentious debates in agriculture and food production to emerge in recent years in the United States and worldwide as has been the regulation of genetically modified organisms (GMOs). Beginning with the introduction of herbicide tolerant and insect resistant crops in 1996, the percentage of GM crops planted in the U.S. has increased exponentially. Over 90% of corn, soybeans and cotton crops in the U.S. are genetically modified (USDA ERS 2017). Proponents of GMOs cite the many benefits of GM agriculture including labor efficiencies and increased profits for farmers, environmental benefits with decreased spraying of pesticides and moral arguments of introducing nutrient-enhanced crops to nutrient-poor areas (Asis 2017; Curchoe 2017; Saletan 2015; NAS 2016; Glover 2010). However, the public has remained skeptical of the mass adoption and commercialization of these crops citing risks to human health, degradation of the natural environment, and further concentration of the corporate agricultural sector (Benbrook 2012; Kaur et al. 2013; Thomas 2014; Cassidy 2016;

FOE 2017). According to a poll conducted in 2016, 52% of the public think GMOs are unsafe and 93% think the government should require labeling (ABC 2016). With an uncertain and distrustful public, state ballot initiatives for GMO labeling emerged in the early 2010s beginning in the West (California, Oregon, Washington, Colorado) with no success. However, beginning in 2013, the Northeast began to see partial success with legislative campaigns for the labeling of GMOs, beginning with a partial passage of a labeling law in 2013 and 2014 in Connecticut and Maine respectively and complete passage in Vermont in 2014. Despite repeated attempts by activist groups and legislators, Massachusetts and New York were never successful in the passage of a GMO labeling law.

I apply the Advocacy Coalition Framework (ACF) to analyze the GMO labeling policy developments across multiple states in the Northeast within a five-year period (2012-2017). The ACF is one of the most established frameworks with which to study conflict and public policy development and has been used to assess a range of contentious political battles including climate change, energy and public health issues (Elgin and Weible 2013; Fischer 2014; Lodge and Matus 2014; Steinman et al. 2017). In this article, I explore the conflict narrative of stakeholders involved in these labeling initiatives to understand how they influenced the policy process across the states. I compare the perceptions of policy actors in Connecticut, Maine, Massachusetts, New York and Vermont to emphasize differences in these perceptions among stakeholders within and across the five states, who supported GMO labeling relative to those who opposed it. I also draw on the political opportunity structure concept, which has been used in conjunction with the ACF (Kubler 2001) to emphasize the broader political system within each of these distinct policy development cases. The political opportunity structure concept has informed social movement research by arguing that social movement success is dependent upon

opportunities afforded by the institutional structures within a policy-making context (McAdam et al. 1996). In comparative policy studies, analysis of political opportunity structures provides another factor through which to compare across case studies. In descriptively comparing perceptions of policy actors involved and the politics in and across these five states, I intend to understand why there was a diversity of policy outcomes (passage, failure and stagnation) in GMO labeling in this region. My research is guided by the following four research questions: (i) *Who are the policy actors involved in the GMO labeling initiatives?* (ii) *What are their perceptions of the problem of GMOs?* (iii) *What are their potential policy solutions?* (iv) *What are the political opportunity structures within each state and how do they enhance or obstruct the political capacity of certain policy actors?* I first present the analytical framework that guides my research, followed by a comparative summary of the GMO labeling policy situations across the five states. I then describe methods for data collection and analysis with the framework. I then discuss these findings and implications for future agri-food policy development.

Theoretical Framework

The Advocacy Coalition Framework (ACF) was originally developed by Paul Sabatier and Hank Jenkins-Smith in the 1980s and has become one of the most utilized frameworks to analyze the policy process within policy development research (Jenkins-Smith et al. 2014). The ACF uses a policy subsystem as its primary unit of analysis in which to understand policy processes (Sabatier 1988; Weible and Nohrstedt 2013). Policy subsystems are composed of a policy issue, a geographic area and a group of policy actors hoping to influence policy affairs within the subsystem (Sabatier 1988). These subsystems can be nested within each other, such that a local subsystem policy issue is nested within the regional subsystem of the same issue.

Actors within this policy subsystem could be legislators, interest groups, government agencies, scientists, the media, etc. These actors are motivated by shared belief systems consisting of normative deep core beliefs, subsystem specific policy core beliefs and narrow secondary beliefs (Putman 1976; Peffley and Hurwitz 1985; Sabatier and Jenkins-Smith 1993). The ACF organizes this belief system into a three-tiered structure. The first and broadest is *deep core beliefs* based on normative values and not tied to any specific policy subsystem. Next is *policy core beliefs* that are values based on a specific policy subsystem. These beliefs identify the problem, the underlying cause of the problem and example solutions. Lastly, is *secondary beliefs* that will specifically identify policy instruments to alleviate the problem outlined in the policy core beliefs. These belief systems influence how individuals interpret information and strategies they will invoke for change (Munro et al. 1997; Munto et al. 2002; Ripberger et al. 2014). Groups of actors with shared belief systems (most notably policy core beliefs) will be drawn to work together to form policy networks or advocacy coalitions to turn their shared policy core beliefs into actual policy (Weible and Sabatier 2005; Henry et al. 2010; Henry 2011; Ingold 2011; Matti and Sandstrom 2011).

Advocacy coalitions are defined as groups of actors that share policy core beliefs who attempt to pass policies that align with their beliefs before actors in coalitions with contradictory beliefs attempt to do the same (Jenkins-Smith et al. 2014). Policy subsystems are often composed of one to five advocacy coalitions attempting to change policy (Weible et al. 2009). Shared beliefs among advocacy coalitions have been found to be related to an advocacy coalition's stability in policy development over time. Even when new beliefs emerge within coalitions due to changes in the subsystem that make them more salient to coalition members, a core set of shared beliefs will maintain a coalition's stability over time (Pierce 2011). "Biased assimilation"

describes the process whereby actors will interpret new policy-relevant information in a way that supports their existing belief system (Innes 1978; Lord et al. 1979; Munro and Ditto 1997; Munro et al. 2002).

I also draw upon aspects of resource mobilization theory (RMT) to evaluate external resources available to coalitions, strategies employed and overall political climate within each state. RMT is notable for focusing on influences outside the social movement under study (Johnson 2000). With effective use of resources and optimization of political opportunities groups can achieve social movement success (Flynn 2013). Authors utilizing the ACF have termed the access to resources such as formal legal authority, public opinion, financial resources and leadership as "political capacity" (Weible and Heikkila 2016). Weible and Heikkila (2016) define "political capacity" as the "ability to access and use resources that allow coalition members to influence the policy process [and] can shape the effectiveness of coalitions in the policy process" (234). A coalition's "political capacity" will greatly affect a coalition's success or failure in achieving respective policy goals (Kubler 2001; Sabatier and Weible 2007; Nohrstedt 2011; Pierce 2016; Weible and Heikkila 2016; Steinman et al. 2017). RMT has been criticized for solely focusing on external institutional structures and discounting motivations or collective identity among groups attempting to achieve social movement success (Beuchler 1993; Jenkins 1983) and the ACF's inclusion of coalition policy core beliefs analysis addresses this limitation to provide a comprehensive analysis addressing a wide range of factors affecting policy change.

In this study, I use the principles of the ACF to guide my analysis of the diversity of outcomes in the GMO labeling policy initiatives across five states within the Northeast (Table 1). The comparative analysis relies on semi-structured interviews with coalition members and policy

actors to examine coalition structure and membership and to evaluate problem perceptions and policy positions related to GMO labeling across all five states. I also conducted document analysis on materials published by the coalitions themselves including mission statements and newsletters to understand coalition membership and structure. In the ACF, issues will become problems when they are selected and filtered through lenses based on an actor's normative orientation (Sabatier 1988). Policy actors will then form arguments that contain their policy core beliefs (Jenkins-Smith et al. 2014). Thus, how coalition members frame the (non)-problem of GMOs and policy solutions can illuminate their belief systems which, according the ACF, is what binds these coalitions together (Weible and Sabatier 2005; Henry et al. 2010; Henry 2011; Ingold 2011; Matti and Sandstrom 2011). Policy core beliefs, the second tier in the belief system, will distinguish between coalitions (Sabatier and Jenkins-Smith 1993; Weible and Sabatier 2005; Sabatier and Weible 2007; Matti and Sandstrom 2011; Jenkins-Smith 2014). Through interviews, I also evaluate each coalition's "political capacity" based on their narrative account of their involvement in the policy debate, who they formed partnerships with, overall public opinion, and access to financial resources. I lastly compare the political landscape within each state, looking at external institutions or political opportunity structures available to advocacy coalitions to pursue their policy goals. The political opportunity structure concept derives from the argument that the success or failure of social movements is dependent upon the institutional structure and greater political environment in which it takes place (McAdam et al. 1996; Kubler 2001; Giugni and Grasso 2016; Cisar 2017). The ACF has rarely been applied comparatively using similar methods of data collection and analysis (Leach and Sabatier 2005; Weible et al. 2010). Therefore, my methods offer a new approach to comparative analyses using the ACF and can

help identify case-specific insights and bring forth patterns across cases in the context of GMO labeling policy development at the state level.

Table 4.1 Evaluation methods for each ACF principle under study

ACF Principle	Method of Evaluation
Coalition structure	Categorization of members within each coalition through interviews with coalition members and document analysis of coalition self-published materials (newsletters, mission statements, etc.)
Shared belief system	Framing of (non)-problem of GMOs and potential solutions through interviews with coalition members
Political capacity	A coalition's access to resources, legal authority, finances, etc. through interviews with coalition members
Political landscape	Identification of external institutions and political opportunity structures within each state and interviews with state legislators

Setting the Stage: GMO Labeling Across the Northeast

Connecticut

Connecticut was the first state in the U.S. to pass a GMO labeling law in 2013. *HB-6527 An Act Concerning Genetically-Engineered Food* was first introduced in February 2013 and required certain foods for human consumption that are entirely or partially genetically-engineered to be labeled as such. It was referred to the Joint Committee on Children first, then to the Joint Committee on Public Health in April and next the House Committee on Judiciary at the beginning of May 2013. The Governor signed the bill into law on June 25, 2013. The bill had over 65 cosponsors and in the House received 134 votes in favor with only 3 against and 13 absent or choosing not to vote (CGA 2013a). In the Senate, 34 senators voted in favor with 0 against and only 2 absent or not voting (CGA 2013b). While Connecticut was the first state to pass a GMO labeling law, the law did not go into effect immediately. An important facet of the bill was the attached "trigger clause" which stated that before Connecticut's law could go into effect, a similar law must be enacted in four neighboring states, one of these states must border Connecticut and the total population of states must be 20 million (CGA 2013c). Connecticut

legislators has been introducing GMO labeling laws to the state legislature since 2011 with *HB-5868 An Act Requiring the Labeling of Genetically Modified Food* introduced by Rep. Diana Urban but only had two co-sponsors listed and never made it out of the Committee on Public Health (CGA 2011). GMO labeling began to gain a bit more traction in 2012 with the introduction of *HB-5117*, introduced in February 2012 with 25 cosponsors and a public hearing held on the subject and was favorably voted out of the Environment committee but never received a floor vote (CGA 2012).

Maine

Maine was the next state in the U.S. to pass a GMO labeling law in January of 2014. *LD-718 An Act to Protect Maine Food Consumers' Right to Know about Genetically Engineered Food* was signed by Governor Paul LePage with the similar trigger clause requirement as Connecticut's law. Maine has a history of introducing state laws concerning the regulation of genetically engineered products. In the 124th legislature (2008-2010) three bills were introduced on regulating the planting of genetically engineered plants (in efforts to prevent contamination of other non-GE seeds) and establishing farmers' rights in instances of intellectual property rights theft claimed by GE seed companies. *An Act to Establish Annual Reporting for Genetically Engineered Crops* was passed and signed by the Governor in 2009 requiring that manufacturers selling GE crops report acreage to the Commissioner of Agriculture (Maine Legislature 2009). In the 126th legislature (2012-2014) *LD-718* was introduced to the Committee on Agriculture, Conservation and Forestry in March 2013 with a public hearing held on April 23, 2013. Maine's House passed the bill with a vote of 141 to 4 and the Senate unanimously supported the decision as well. Ultimately the bill was enacted in January 2014 (Maine Legislature 2014).

Massachusetts

In Massachusetts, acts related to the labeling of GMOs (food and seed) were introduced into the state legislature starting in the 2013-2014 session. In the following session (2015-2016) three bills were introduced, notably *House No. 3242* by Ellen Story (D) and Todd Smola (R). In January of 2015 the bill was referred to the Committee on Environment, Natural Resources and Agriculture (The General Court of the Commonwealth of Massachusetts 2016a) and a public hearing was conducted in September of 2015. The bill contained 154 cosponsors and was reported favorably out of the Committee on Environment, Natural Resources and Agriculture and was referred to the committee on House Ways and Means in April 2016. However, it was reported as "no further action taken" in January of 2017 (The General Court of the Commonwealth of Massachusetts 2016b) due to the passage of the federal GMO labeling law in July 2016 which preempted any current and future statewide labeling laws.

New York

Between the House and the Senate, in 2016, New York introduced six bills related to the labeling of GM foods. Bills were also introduced concerning a GMO registry to track seeds sold throughout the state, labeling for vaccines with GMOs, and conducting a study on health and environmental effects from GMOs (NCSL 2016). *Labeling of Genetic Engineering Products, A. 617*, filed by Assembly Member Linda Rosenthal (D) and *S.485*, filed by Senator Kenneth LaValle (R) were initially referred to the Consumer Affairs and Protection Committee in January 2015 and ultimately voted out the following year (February 2016) with a vote of 9-7. The bill contained 48 co-sponsors and GMO labeling activists held a NY GMO Labeling Rally and Lobby Day at the State Capitol in Albany, NY on March 8, 2016 to garner attention and support

for the bill (GMO Free NY 2016). The bill next traveled through the Codes Committee, Ways and Means Committee and Rules Committee in June 2016 but stalled in the legislature, never receiving a floor vote (NYS General Assembly 2016). New York had been introducing GMO labeling bills over the last couple of legislative sessions, with relatively similar strong support (the 2013 labeling bill introduced by Rosenthal had 42 co-sponsors as had a similar bill in the Senate under Lavelle) and a public hearing was conducted on the subject in New York City in 2013, but did not allow citizens to testify; only to observe (NYS General Assembly 2013).

Vermont

Vermont has a history of labeling legislation related to biotechnology as the first and sole state to pass a recombinant bovine growth hormone (rBGH) labeling law for milk made with the genetically engineered hormone in 1994 (Maine passed a law the same year requiring labels on products *not* produced from cows treated with rBGH) (Schneider 1994). However, the law was deemed unconstitutional, and Vermont was forced to remove its labels since the court determined there was no difference between milk from treated and untreated cows (a label is only required when there is a significant difference between the final products as mandated by the Food and Drug Administration) and "consumer interest" was not deemed valid to warrant a label (Runge and Jackson 2000; Lowe 2015). Popular among Vermont dairy products has been the use of voluntary, value-added labels such as "rBGH free" or "Dairy not treated with rBGH" including the Vermont-based ice cream chain Ben and Jerry's, that has been a vocal opponent of the use of rBGH in dairy products and was active in the rBGH labeling push in the 1990s (Ben and Jerry's 2017).

In the 2011-2012 legislative session three bills were introduced to require the labeling of GE food. While these bills only travelled through a few of the committees and never received a floor vote, *H. 722 An act relating to the labeling of food produced with genetic engineering* introduced by Rep. Kate Webb had a multitude of witnesses testify to the House Committee on Agriculture and a public hearing was held for citizens to testify as well. Witnesses ranged from small Vermont businesses and farms to national biotechnology firm representatives, local and national government officials and medical professionals (Vermont General Assembly 2012). In the following session (2013-2014) House (*H.112*) and Senate (*S.89*) bills were introduced related to the labeling of GMOs. *H.112 An Act relating to the labeling of food produced with genetic engineering* had five sponsors with 45 additional cosponsors. The bill was first introduced in January of 2013 and travelled through multiple committees and passed through many House roll call votes with amendments added over the year. In April of 2014, it passed through the Senate the final time with a vote of 28-2 and in the House of 114-30 (Vermont General Assembly 2014). The Act was signed into law by Governor Peter Shumlin in May 2014. This bill contained no trigger clause and was set to go into effect July 1, 2016 with the intention of a two-year delay to give food companies time to adjust their package labeling. An interesting facet of the bill was the establishment of a Genetically Engineered Food Labeling Special Fund which was set up in anticipation of costs and liabilities incurred by the Attorney General in implementing this bill (i.e. legal costs when the state of Vermont was sued for the constitutionality of the bill). Immediately following the passage of the bill the Grocery Manufacturers Association (GMA) and others sued Vermont, claiming the law violated the commerce clause (a clause in the Constitution granting Congress the authority to regulate trade among states) and preempted by federal law. However, a couple of months after the lawsuit was introduced, a judge ruled that the

GE disclosure requirement was "reasonably related to the State's substantial interests" and was therefore constitutional (Judge Christina Reiss as quoted in Falko 2015) which differs from the previous ruling on the rBGH labeling. The Environmental and Natural Resources Law Clinic (ENRLC) from the Vermont Law School with co-counsel from the Center for Food Safety represented the State of Vermont throughout the legal proceedings over the following year but ultimately the federal labeling law *S.764 The National Biotech Disclosure Law* passed in mid-July 2016 (only two weeks after Vermont's labeling law went into effect), which pre-empted state labeling laws and Vermont's law became null and void.

Methods

The data for this study were drawn primarily from semi-structured in-depth interviews with forty key stakeholders involved in the GMO labeling initiatives across the five states, with additional research analyzing coalitions' self-published materials on their websites including newsletters and mission statements. Interviews conducted included 6 in Connecticut, 5 in Massachusetts, 8 in Maine, 9 in New York and 12 in Vermont. All interviews were confidential and were assigned pseudonyms for purposes of presenting findings in this study (See Appendix C for complete list of interviews). I used a modified snowball technique (Birkland 2004; Michaels et al. 2006; Weible et al. 2010; Anderson and MacLean 2015) to identify individuals and organizations involved in GMO labeling in each of the five states. Key stakeholders were identified through a review of witness testimony from statewide public hearings on GMOs, online sources and news media as well as recommendations from other interviewees. Interviews were conducted between May 2015-August 2017 via telephone or in person and lasted about 30-45 minutes. All interviews were recorded with permission from the participants, and transcribed

verbatim. Questions pertained to identifying rationales for why GMOs should or should not be labeled, positions on the current policies surrounding GMOs, recommended policy solutions, strategies employed and resources used in the initiative, as well as partnerships formed among groups across and within states.

Using a thematic analysis approach (Daly et al. 1997; Boyatzis 1998; Braun and Clarke 2006) I developed a list of inductive codes that emerged from the data. After coding I summarized the coded text by ACF constructs (policy core beliefs, resources, strategies) to highlight key themes and subthemes within the framework to better organize my findings (Miles et al. 2014). Thematic content analysis has been recognized as an effective way in which to analyze the data to bring forth policy core beliefs (Sabatier and Jenkins-Smith 1993). The qualitative software program *Atlas.ti* was utilized to analyze the data.

Results

To map and compare the politics of GMO labeling across the five states, I first present the structure of the different advocacy coalitions within each state. I follow with a summary of the major perceptions of the problem of GMOs and potential solutions within each state, gathered from thematic analysis of interviews with stakeholders involved in the initiative to bring forth policy core beliefs. I then discuss the unique political opportunity structures composed within each state and differences in political capacity for different actors.

Advocacy Coalition Structures in the Policy Subsystem

Proponents of GMO labeling across all five states included consumer advocacy organizations, organic and/or small farming associations, environmental groups, and specific

"GMO free" or GMO labeling groups. Opponents of labeling mostly included statewide grocers', retailers' and food producers' associations, regional biotechnology trade associations and select farm advocacy groups. Within each state, opponents and proponents were represented by a handful of these types of organizations. In Vermont's labeling coalition, there was a much larger representation of small, local farm groups. The labeling proponent coalition was started and led by a small farmer which brought in other local farmers as well as Vermont farmer advocacy groups[5]. Maine had a relatively high representation of farmer organizations as well. An organic farming group led the state labeling initiative in Maine, joined by the state's farm bureau and local food advocacy groups as well. While the New York labeling coalition did contain consumer rights groups, labeling groups and farmer advocacy groups, there was a strong representation of environmental organizations. For the most part, the opponent labeling coalitions were relatively uniform across all five states, however it was noted from interviews with members of New York advocacy coalitions and legislators, that the farming industry in New York was a sizable and influential opposition force in the state against labeling. That sentiment was not expressed as strongly when talking with members and legislators within the other states.

Why should GMOs be labeled?

Interviews with proponents of GMO labeling stated that their main reasons for wanting GMOs labeled was because it was a "consumer's right to know." Across all five states GMO labeling was tied to the consumers' right to access to information about their food, to make better

[5] If you reference their coalition website "Vermont Right to Know", the majority of members represent small Vermont organic farms (Vermont Right to Know 2017).

informed decisions and the need for greater transparency in the food system. Ellen, a member of an environmental group in New York stated:

> From a consumer perspective, this is a right to know issue. People want to know what they're eating, they have a right to know. And people can have different reasons for why they want to know, they could be religious, they could be environmental, they could be simply they want to be an informed consumer (GMO 123).

For some advocacy groups, mostly based out of Vermont, they tied the consumer's right to information to a basic human right for information. Taking away access to information about food was seen not only as an affront to the rights of a consumer but also to those of citizens. Kate, a member of a farmer advocacy group in Vermont stated, "It [food] is one of the most fundamental choices we make as human beings, what we are going to put in our mouths, what we are going to put in our body and what we're going to feed our kids…People just wanted to know" (GMO 132).

Another popular reason stated for why GMOs needed to be labeled was the risk of corporate concentration and control associated with GMOs in the food industry. Biotechnology companies controlling the seed and the herbicides used in conjunction with the seed, held too much power over farmers and the greater public. The industry's lack of transparency in opposing these GMO labels only heightened the public's distrust and fear of these companies. The GMO labeling issue became one tied to corporate domination and control in the food system. Don, a founding member of a labeling group in Massachusetts stated, "Food companies and chemical companies have built a business model around the lack of transparency in the food economy. Their business model relies on people not knowing and consuming their product" (GMO 108). Proponents of labeling also referred to the relationship between industry and the government as

corrupt. The current regulatory framework for GM crops requires the company producing the crop to demonstrate that the final GM product is "substantially equivalent" to its non-GM counterpart. If this comparison is demonstrated then the government does not require any further regulation or oversight. Labeling proponents have viewed this governmental regulatory system as a clear example of a *lack of* regulation, only increasing the power the industry holds over the public and embodying a threat to democracy. Bob, a farmer from Maine stated:

> These multinational mega corporations are scared to death of competition and free flow of information. And free flow of information is required in a democracy, not that these corporations have any use for democracy. Democracy stands in their way of power and money…Who do they serve? Do they serve the commons or do they serve their own selfish self-serving position? I think you can get social progress if you combine wise use of food dollars with good legislation that restrains these corporations from screwing people over because that's what they're doing. They have to be restrained because they will just keep running people over (GMO 115).

Where legislative mandates were lacking, GMO labeling was seen as a market solution to give the public information they needed to take back some of the power these corporations had acquired from the people over the past 20 years. GMO labeling was giving the people the right to know, and for some advocacy groups, that information would empower the public while simultaneously weakening the industry.

Massachusetts, Vermont, Connecticut and New York members of the labeling coalition also stated the need for more scientific studies to demonstrate GMO safety. Since many of the scientific studies submitted to the government to demonstrate "substantial equivalence" between the GM crop and non-GM counterpart are conducted by the industries marketing these products, certain labeling proponents do not trust the results. They called on more independent scientists to conduct their own studies before the U.S. government and public embrace these products so

readily. Brianna, a member of a labeling advocacy group in Connecticut stated, "There hasn't been much testing of GMOs, they haven't been proven to be safe…so more testing is needed to consider if they should be consumed. Other countries do take the precautionary principle, our country doesn't seem to do that so certainly labeling is warranted" (GMO 101). With the lack of independent scientific studies demonstrating safety, a label was considered a stop gap measure until their safety could be confirmed by scientists who did not work for the companies marketing these products. Not surprisingly, based on the representation of their coalition membership, New York labeling proponents referenced the environmental risks of GMOs the most when asked why they wanted GMO labeling. Environmental risks included the increase in herbicides being sprayed with the planting of GMOs and the proliferation of herbicide resistant weeds with the overuse of these herbicides, which now resulted in increased use of more toxic herbicides thus polluting land and water.

The advocacy coalition members from Vermont were the only members out of the five states to mention that part of their reason for pushing for GMO labeling was to refocus attention on alternative agricultural solutions for future food production. Many members discussed their goal of revitalizing sustainable or "regenerative agriculture" defined by Kate, a representative of a farm advocacy group in Vermont as "focusing primarily on the health of the soil, creating nutrient-dense foods, whole foods" (GMO 132). Kate went on to discuss that with issues of pollution from increased herbicide use with GMOs, they were hoping to shed light on these risks and work on sustainable solutions for their farmers. She stated:

> We believe in the face of all the other challenges out there with climate change, with economics, this type of farming is the methodology that is going to be sustainable over the long term and it's going to give us a sustainable food supply and it's going to give us the ability to maintain the economic viability of the planet.

> And that's really crucial to the state's agricultural history, our culture and our topography (GMO 132).

Vermont coalition members cited problems with the whole industrial, technological-driven, monoculture agricultural system and hoped that GMO labeling would bring greater awareness to these issues. Joe, a farmer from Vermont stated that GMO labeling was a "vehicle to wake people up about what is going on in the food system…our argument is not just GMOs, it's like enormous toxicity in the foods, high use of antibiotics, high use of hormones…" (GMO 133). Vermont members also made references to farmer risks and specifically organic agricultural risks with GMOs, (for example farmers being forced to buy new seed and more pesticides each year and GMO contamination problems) much more prominently than any other states' coalition labeling proponents.

Why should GMOs not be labeled?

For opponents of GMO labeling, the responses were relatively uniform across the five states. Opponents to labeling did not want a label because the economic risks would be too high, the label would in fact inhibit consumer rights by causing further confusion, and if there was going to be a label, it should be at the federal level to ensure consistency and uniformity in labeling. Dan, from a local manufacturing trade association in Maine stated, "So there is a certain labeling law in Maine and there is a certain one in Vermont and there is a different labeling law in Connecticut but no labeling law in Illinois. That creates for companies doing business in more than one state, a regulatory environment that is literally impossible to navigate" (GMO 119). Other food manufacturers referred to a statewide labeling regulatory structure as a "distribution nightmare" (John, GMO 111) or an "operational and regulatory nightmare" (Dan, GMO 119). George, from a New York farmer advocacy group echoed the same concerns:

> If you have a patchwork of state mandates across the country that have different criteria, different standards, that makes it very difficult for farmers who sell directly to consumers, food processors and food companies to distribute their products across state lines…because the regulatory dynamics are too difficult for them to navigate (GMO 128).

George goes on to state how this then directly hurts farmers by forcing some to switch to non-GM crops, which ultimately "reduces options for our farmers for what they grow. It takes tools out of their basket in terms of finding crops that are best for them and what they choose to grow" (GMO 128). This then negatively affects a farmer's profit margins, reduces choices for consumers in the marketplace, and could increase the price of food for consumers. Many opponents to the mandatory labeling law called for the use of a voluntary labeling law. They reasoned that the decision to practice non-GM agriculture was a business decision. If a farmer wanted to grow non-GM crops then they could advertise this with a value-added label. A voluntary label would promote free market ideals; if someone wanted to take on the added expenses of growing non-GM crops then they could market their product at a higher price to offset that added cost. Diana, a member of a farmer advocacy group in Connecticut states:

> My way of looking at it is, it's the cost of doing business. It's no different than if you have to pay for your licenses, your fees, permits, whatever you need. If you feel that strongly enough about this issue and if you feel there's a benefit to your consumers or your customers having this information...there's a cost of doing business and the producer has to pass that on and the consumer pays for it (GMO 105).

Opponent interviewees highlighted that for smaller farmers, producers or retailers this added cost is significant. While large corporations may be easily able to change labels for regional distribution or switch a subset of their ingredients to non-GMO, those hit hardest by the increased costs would be local, small farms and businesses, which would negatively

impact the statewide economy as well. In Connecticut, a local biotechnology firm that opposed labeling explained how scientific studies did in fact demonstrate GMO safety and that GMO labeling could inhibit biotechnology innovation in the state. Christopher, from the biotechnology advocacy group stated:

> We're trying to nurture a biotech life sciences, this sector, this cluster [in CT]. The science behind GE foods is very similar to what is going on in labs and biotech companies making medicine….We can't be anti-science when it comes to very similar science that improves food (GMO 106).

The bioscience council from Connecticut appeared optimistic that if the public had more education on the science of bioengineering (open discussion of risks and benefits) rather than just adding a label to food products, the public may be more accepting of the technology. The acceptance and support for biotechnology could lead to growth in the biotechnology sector within the state, thus benefitting the industry and the state's economy overall. Here a label was a hindrance to a potential economic opportunity in a burgeoning field in the state.

Political Capacity and Political Opportunity Structures

The ACF looks at policy change over time in relation to the formation, resources and strategies of advocacy coalitions. External events on the policy subsystem will determine certain constraints and resources for these advocacy coalitions. Since the GMO labeling case studies take place within five different policy subsystems containing different actors and different political structures, it is important to compare differences across these structures. Political opportunity structures will influence an advocacy coalition's political capacity (i.e. their ability to achieve their policy goals).

The National Conference on State Legislatures (NCSL) categorizes the capacity of state legislatures to function as independent branches of government by evaluating the time legislators spend on the job, the amount they are compensated and the size of the legislature's staff. Massachusetts and New York are considered by the NCSL (2017) as "Green" and "Green Lite" respectively, signifying full-time, well-paid legislators with large staffs. However, a fully functioning state legislature does not equate automatically to a political opportunity structure amenable to progressive policy change. Both GMO labeling bills introduced into these state legislatures never received a floor vote nor came to fruition before the enactment of the federal labeling bill. Peter, a Massachusetts legislator described the difficulty and time it took to gain overall legislator support on the bill and acquire a significant number of cosponsors. The key to gaining support for passage was to make the bill bipartisan. In order to get to the support they obtained in the beginning of 2016 for the state labeling bill, they had to work on streamlining their argument so it was comprehensive and agreeable to the widest population of legislators. He states:

> The mission was to label things with GMOs. I had to tell all of these groups who wanted us to preach that GMOs were terrible… 'let's focus on what brought us here and that is to label products that have GMOs in them'. We even eliminated some of the more radical arguments of whether or not people thought GMOs were healthy for you or not…You can use that advocacy as an argument but at the end of the day we want to see this pass so let's not try to get down into the weeds of it (GMO 109).

According to Peter the key to getting the bill passed was simplicity. The way in which to gain the widest support was to stick to the simple argument of the need to give consumers information about a product. This was an argument that could attract members from both sides of the aisle.

For New York, GMO labeling appeared to be an uphill battle right from the start. Barbara, a New York legislator discussed the immense number of statewide and national lobbyists present in the Capitol building fighting in opposition (mainly farming and biotech interests) to the state labeling bill. As Barbara stated, "Anytime New York passes something it gains attention around the country just because we're New York" (GMO 126). With a population of 19.75 million (the 4th largest in the U.S.), New York's passage of the bill would have fulfilled neighboring states' trigger clauses and would also have most likely propelled a cascade of other states to pass their own statewide labeling bill. With opponents attuned to this possibility, opposition interests determined to prevent this bill from passage employed an influx of lobbyists to convince legislators to not support the bill. And they were essentially successful at their job. Barbara said lobbyists "were everywhere" and "did all sorts of tricks to get them [legislators] off the bill" and even got small businesses to come out against the bill, which she believed "were ginned up by the lobbyists" (GMO 126). Furthermore New York's diverse population, geographic landscapes and communities across the whole state bring a broad array of concerns into the public policy arena. As Barbara stated, "There is always that problem of balancing upstate and downstate concerns" (GMO 126). Referencing rural, farm-populated communities and rust-belt cities in central and upstate New York versus urban areas downstate, it can be difficult to find common ground on certain policy issues, especially those in which the farm bureau has a stake in the outcome. As Barbara warned, "For some people, the Farm Bureau can go against you and then your seat is in jeopardy" (GMO 126). For full-time legislators with highly paid staff present in Massachusetts and New York legislatures, this was a beneficial opportunity structure for advocacy coalitions with greater financial resources (ability to hire

lobbyists) to gain access and influence in their local policy-making arenas, whereas coalitions lacking these resources could not gain [easy] access.

Connecticut is considered a hybrid of the traditional citizen legislature and the "green" full-time, well-paid, large staff legislatures. Connecticut legislators typically spend about 2/3 of a full-time job working as a representative, usually require supplemental income and have an intermediate-sized staff (NCSL 2017). Since Connecticut was the first state in the U.S. to pass a GMO labeling law, there was great fear that Connecticut would become isolated, incapable of encouraging new business and hindering interstate trading of food. The trigger clause became a necessary component for passage. Ann, a legislator from CT stated how major food brands threatened to not ship food to the state because "we can't just label what is in CT" (GMO 103). She went on to explain that the Governor stood staunchly against the bill without a trigger clause. Ann states, "He said, 'No way. I'm vetoing anything that comes out because we're not going to be the only state in the nation besides VT that has a labeling law and we're not doing it'" (GMO 103). While advocates were unhappy with the inclusion of a trigger clause, they also expressed their understanding that a compromise would get the bill passed. As Jamie, an advocate from Citizens for GMO labeling stated, "You can't let perfect be the enemy of good. And there is a time to compromise" (GMO 102). Connecticut also held two public hearings on the GMO labeling issue and had major momentum from grassroots activist groups advocating for the labeling bill. Many activist groups and legislators interviewed from CT referenced Tara Cook-Littman as one of the great leaders in the movement. She was one of the founders of GMO Free CT and a past prosecutor for New York City who ran for state representative in Connecticut. Due to her experience in law and politics, she was well-versed in the area of public policy and became a key spokesperson for the coalition, and was able to gain access to state and

even federal legislators in the GMO labeling discussions. She was a key resource for the coalition for labeling as she increased their political capacity in her access to government officials, legal authority and connections with other political allies (Weible 2007; Elgin and Webible 2013).

With a NCSL categorization of "Part time Lite" legislature, meaning low pay and small staffs, usually found in rural states with small populations, Vermont was the only state in which the advocacy coalition in support of labeling was truly successful. A GMO labeling law passed in 2014 and went into effect in July 2016 without the need of a trigger clause to be fulfilled. While interviewing stakeholders active in the labeling campaigns, many referenced the very accessible "citizen legislature" in Vermont. Legislators are in office for five months out of the year and will usually have secondary jobs in their home communities, which Bill, part of a consumer advocacy group in Vermont, stated, "makes them really really responsive to constituents" (GMO 135). A farmer, Joe, one of the founding members of the coalition for labeling in Vermont, discussed how accessible the Vermont statehouse is for the public: "They [legislators] don't have offices, they just have committee rooms and the cafeteria is open to the public. Very few states you can go into the cafeteria and basically accost them. We're lucky with that" (GMO 130). The Vermont General Assembly website also lists the home address, home phone number and personal email contact for each legislator. Beth, a legislator stated, "People know where I live. You can Google Earth my address and you'll see my garden and my animals out in the pasture. So we are very in touch with our constituents and I think that they realize that" (GMO 137). The combination of access points for engaged citizenry in the Vermont General Assembly as well as representatives directly tied to their home communities creates institutional structures amenable for civic engagement (Abel and Stephan 2000). Vermont held two public

hearings on the GMO labeling bills where citizens overwhelmed the courthouse (over 100 people attended the 2012 hearing and over 200 in the 2014 hearing) traveling from across the state to have their voices heard on the issue (Farm Aid 2012; Victory 2014). With direct democratic practices such as public hearings and open-access to the statehouse, citizens can feel they have direct access and influence on bills coming through the state legislature. Compared to other states, specifically in New York, Vermont legislators stated how they were surprised by the absence of lobbyists in the Vermont statehouse. Tom, a legislator in Vermont states:

> I was expecting that the opposition would be a lot more visible in the statehouse but this wasn't the case with the labeling bill. I later found out that the industry conceded that Vermont was going to this pass this law but they would have a chance in court of defeating it…They kind of stepped back and let it happen because they thought it was going to win in court (GMO 135).

Even at public hearings, opponents to the bill were wholly absent. It also appeared that Vermont was excited about the potential of being a leader on this labeling bill for the rest of country, which explains the absence of a trigger clause in their legislation. Unlike the other states, there was no need for a compromise to get the bill passed. As Beth states, "We just did it. We just said, 'the hell with it'" (GMO 137). Activist groups distributed articles on the defects of a trigger clause to legislators emphasizing the leadership potential, highlighting the "we want to be first" sentiment (Joe, GMO 133). Vermont has often led the way on progressive policy. As many legislators articulated when asked why they thought Vermont was the first and only state to pass and enact a labeling law, Vermont has a history of progressive legislation such as being the first state to ban slavery, the first to legalize gay marriage through legislation and the first state to legalize recreational marijuana (even though it was later vetoed by the governor). As

Joanne, another legislator from Vermont stated, "We're a feisty little state and we're willing to go out there" (GMO 138).

Maine is also categorized as a "Part-time Lite" legislature by the NCSL (2017). Similar to Vermont, their legislature website lists legislators' home addresses (absent though of personal email and phone number). However, unlike Vermont, legislators and stakeholders from Maine did not reference the ease of access to Maine's representatives. In fact, many activist labeling organizations in Maine referenced the varied impediments to getting the bill passed, with the major one being the Republican Governor's approval. One farmer, Bob stated, "We knew the biggest job was to get it past our maniac governor who has last year called himself 'little Donald' and there is a shocking similarity in terms of disregard for truth, hotheadedness, the simple mindedness…" (GMO 115). Multiple interviewees stated that the Governor would only sign something if it had Republican support on the bill. Lance Harvell, a Republican from Farmington, Maine was one of the main co-sponsors on the bill and many deemed a champion in the legislature for GMO labeling. Mary, from an organic farming group in Maine stated how Lance was:

> …amazing. He just believed so strongly in it. He was amazing in the way that he was able to educate people about the issue and bring a lot of people who either were suspicious of this kind of legislation or not really convinced that there was really a problem (GMO 117).

And while Rep. Harvell was able to gain strong bipartisan support for the bill and gain support from the Governor, a trigger clause was a necessary component. Jill from an environmental organization in Maine stated:

> The reality is we have a very closely divided legislature…in order to get the rest of his [the governor's] republican colleagues on board, they ran with this trigger. So it wasn't our preference but

> we're also political realists and we knew the bill wasn't going to pass unless we had it (GMO 112).

Also present in the Maine's legislature but absent in Vermont, were the lobbyists. And as some observed, they were ever-present. Jessica, from a local food advocacy group in Maine described how national and state groups were present many times in the statehouse, specifically the Grocery Manufacturer's Association (GMA) and dairy farmers. Jessica states, "The woman who is the GMA lobbyist is one of the biggest players in Augusta. When she walks down the hallway, all of the legislators pay attention to what she says. She and the dairy industry were fighting us tooth and nail" (GMO 114). With financially powerful and influential forces from the anti-labeling coalition, a divisive bipartisan legislature, and with less opportunities for direct access, the pro-labeling coalition was not able to gain as much traction and influence in the state of Maine compared to Vermont.

Discussion

This comparative approach in policy development across five states helps to illuminate case-specific insights as well as identify patterns across cases. Findings from this research highlight differences in advocacy coalition membership, perceptions among supporters and opponents to GMO labeling, and political opportunity structures across states. Below I discuss the main findings from the analysis of comparisons of coalitions and comparisons across states.

Belief Stability among Coalitions

The ACF suggests that individuals are motivated by belief systems and will form coalitions with others who share common beliefs (Jenkins-Smith et al. 2014). Belief systems are

the causal link for explaining network structure of advocacy coalitions (Henry 2011; Matti and Sandstrom 2011) and the stability of coalitions overtime (Jenkins-Smith and St. Clair 1993; Zafonte and Sabatier 2004). Across all coalitions in all states in support of GMO labeling, individuals stated that a common rationale for labeling was the consumer's right to know in conjunction with distrust of large powerful corporations tied to GM crop production. These rationales can be tied to policy core beliefs that embody the importance of individual rights, accountability, free-flowing access to information and freedom of choice in the marketplace. Corporations should be held accountable to provide information to the public, which the public can use to make a purchasing decision. The only way to guarantee that corporations would be held accountable and provide that information would be through government-mandated requirements. While these policy core beliefs espoused the tenets of individualism, labeling advocacy coalitions relied on the government to ensure corporations' transparency. Many advocacy groups stated that voluntary labeling "was not enough." Corporations were already demonstrating their inability to be transparent when it came to GMO production exemplified through patent laws on GMOs barring access to scientific research data and by their actions deliberately blocking this labeling bill. After asking Peter, the legislator from Massachusetts why private labels could not offer a solution on their own, he stated:

> Practically speaking they [corporations] are not going to do something unless we tell them they should do it. They wouldn't be labeling their product now if there wasn't some sort of requirement to do so by an authority within the government that makes rules and regulations for people's daily lives (GMO 109).

Advocacy coalition members' main rationales against labeling included the economic risks and consumer confusion associated with adding a GMO label. These policy core beliefs fell under ideals of laissez-faire capitalism. Private companies should be able to make their own

production or marketing decisions for profit and the government should not interfere by creating unfair advantages and disadvantages for certain states or production practices. These policy core beliefs also included the importance of individual rights. If an individual is concerned about a certain characteristic of a product then that individual can choose to avoid those products (i.e. a common argument for non-labeling activists was the fact that the organic label already exists which will tell a consumer whether or not the product is made with GMOs). Even though the advocacy coalitions across the five states included a diversity of members (biotechnology industry, scientists, farmers, food industry), they were all bound together by these common policy core beliefs. As articulated in the previous section by a farmer from Connecticut, if farmers or businesses wanted to become certified and advertise their non-GMO certification then that was their business decision with the added costs, risks, and benefits. The government should not be interfering in these business decisions attempting to sway a farmer, producer, manufacturer or retailer in choosing one type of production over another.

Vermont was the only state where advocacy coalitions in favor of labeling were successful. Can we draw any insights from their policy core beliefs to understand why? Vermont had a greater representation of farmer advocacy groups within their coalition, particularly focused on small-scale, sustainable and/or organic farming in the state. The two groups who started the labeling coalition in Vermont included a farm and a farmer advocacy group. While they shared similar rationales with advocacy groups in the other states focused on consumer rights and fear of concentrated corporate control, they also addressed the need for sustainable farming initiatives for the future of farming in the state. This advocacy coalition included many more members who either were small farmers themselves or represented the interests of small farmers who worked to build a healthy, local, sustainable food system in Vermont. Therefore, an

additional policy core belief for this coalition was the collective goal of sustainable, local food production for the state. This type of local, sustainable agricultural production would increase the economic vitality of farmers in the state and community overall. This policy core belief was not just about increasing profits for farmers within the state (similar to the policy core belief for the coalitions against labeling) but enhancing state economic and *social* development. Lyson (2007) has coined this type of agriculture as *civic agriculture* where local food and agricultural production function "as engines of local economic development and are integrally related to the social and cultural fabric of the community" (19). This practice is usually manifested in direct-marketing operations such as farmer markets, community supported agriculture (CSA) programs, community gardens, food co-ops, or "pick your own" practices. These are also usually more sustainable and environmentally friendly compared to the environmentally, economically, and socially destructive practices associated with the current global industrial agri-food system (DeLind 2002; Lyson 2004; Obach and Tobin 2014). Therefore, Vermont's advocacy coalition policy core beliefs also included the enhancement of local, sustainable (environmentally and economically) agriculture within the state, a belief absent from coalitions in the other states. In a state with a population with a very pronounced environmental and food ethic, connecting GMO agriculture to issues within the greater food system including environmental toxins in the soil resonates well with citizens in the state, gaining greater public support (an imperative resource for advocacy coalitions). By tying GM agriculture to the larger industrial food system as a way to differentiate Vermont's sustainable agricultural practices, GMOs are seen as a threat to the economic vitality and community development in the state.

Coalition Resources, Political Capacity and Political Opportunity Structures

A coalition's ability to succeed or fail is dependent upon the openings in political opportunity structures in which to strategize and engage within a particular political landscape (McAdam et al. 1996; Kubler 2001). Certain types of political opportunity structures will increase a coalition's ability to capitalize from these different opportunities. For state legislatures that employed full-time legislators with large staffs and larger salaries, coalitions with greater financial resources (ability to employ lobbyists) had a much easier time infiltrating the legislature and influencing legislators. Barbara, the New York legislator discussed how lobbyists were ever-present in the statehouse and had the ear of many legislators. She states:

> They shook some legislators' stand on it. They did all sorts of tricks to get them off or not get on the bill. Or not to vote on the bill. I had a lot of difficulty with the lobbying groups filling the minds of legislators with falsehoods…and then some legislators believing them (GMO 126).

Sabatier and Weible (2007) found that coalitions with greater resources had the greatest impact on policy. However, resources do not always have to encompass financial or the ability to hire lobbyists. Pierce (2016) found in his analysis of hydrofracking policy in Colorado that the winning coalition had more public support despite the other (losing) coalitions' greater financial resources. Nohrstedt (2011) has concluded that certain resources (such as pubic support) matter more in policy change than others and that financial resources may be a nonfactor in successful coalitions (Kubler 2001; Pierce 2016). Maintaining a strong coalition was found to the most important strategy for policy change for certain areas (Crow 2008; Gupta 2014; Pierce 2016). Based on findings from this comparative research study it appears that financial resources and the presence of lobbyists do matter. Both Maine and New York interviewees attested to the strong anti-labeling lobbyist pressure in their respective statehouses and Vermont interviewees

testified to the apparent absence of said lobbyists. However, it also appeared that Maine, Connecticut and Vermont had actors with considerable political capacity involved in the labeling movement that gave them elevated access to government officials, legal authority, public support and connections with other political allies (Weible 2007; Elgin and Weible 2013). Maine's labeling movement was spearheaded by a Republican who was able to gain Republican support (specifically the Governor's) on the bill which increased its chances of and led to its passage in 2014 with a compromise trigger clause attached. Connecticut's movement was founded and led by Tara Cook-Littman, firstly identifying herself as a "food blogger and PTA mom" but also a past New York City prosecutor and Democratic candidate in the Connecticut House of Representatives race in 2014 (Pazniokas 2014). While Tara ended up not winning the House of Representatives seat in Connecticut, her experience and proficiency in law and state politics increased her political capacity in the labeling law fight. Lastly, Vermont had the assistance of the Environmental and Natural Resources Law Clinic from Vermont Law School in helping write the law and then defend the law in court when Vermont was sued by the Grocery Manufacturer's Association and others. Kate from one of the advocacy groups in Vermont stated, "They ended up being absolutely crucial in terms of pulling together all of the legal and legislative arguments we needed to make in order to persuade them and also helping us improve the language of the bill" (GMO 132). As stated earlier in the literature, public support and maintaining strong coalitions have shown to be crucial in coalitions successfully achieving their policy goals (Crow 2008; Nohrstedt 2011; Gupta 2014; Pierce 2016). Activist groups and legislators from all states in the study commended the work that labeling coalitions had done on the initiatives. Specifically, stakeholders from Vermont expressed the immense public support behind the issue and the "amazing and skilled" coalition that worked together to educate and

inform the public and legislators (Helen, GMO 131). Jamie, from Citizens for GMO Labeling and active in the Connecticut campaign discusses the importance of an "inside/outside game" in advocacy. She states:

> Whenever you have a legislative campaign you need to have both. If you have a really good inside game and you're doing really good lobbying but you have no outside pressure from constituents then you'll fail. And same if you flip it. If you have a lot of power on the outside with your constituents that you're pushing on the state legislators but you don't have anybody on the inside working that angle, you'll fail. Fortunately for us, we had both (GMO 102).

While the full-time legislatures appeared to benefit lobbyists and coalitions with greater financial resources, the "citizen" part-time legislatures appeared to benefit grassroots, citizen-led coalitions organized from the ground-up. In Vermont, having legislators that spent the majority of their time in their home districts (instead of at the Montpelier statehouse) made them more actively involved in their communities. They were a part of the community itself, and directly accountable to their constituents (i.e. neighbors). In Vermont there were many avenues for regular citizens to voice their concerns to their legislators and affect legislation through direct democratic procedures (easy access to legislators in the statehouse, open committee meetings, public hearings). Laura, a member of an organic advocacy group stated:

> I think we are really fortunate here in Vermont that our democracy in general is pretty intact and functions well compared to a lot of other places throughout the U.S. For example, when we were working on the labeling legislation here, it was really apparent that people did have connection to their legislators and felt confident that they could reach their legislators and share their thoughts and let them know they really wanted this legislation passed and this was an important issue to them. I think the people of our state really have the greatest impact on our legislators whereas in Washington I think there is so much lobbying pressure on the hill constantly and there's so much money being spent on lobbyists I think the voice of the people often gets drowned out (GMO 139).

Along with examples of direct democratic opportunities for citizens, Vermont's history of progressive legislation creates a political climate that endorses revolutionary citizen initiatives.

External political institutional structures within each state create opportunities and barriers for certain groups to advocate their position and influence policy-making at the state level. For New York and Maine, lobbyists were able to gain traction and influence within the policy-making arena which hindered complete passage of a labeling law. Massachusetts also struggled to gain bipartisan support for the bill and the development of a clear, concise message advocacy groups and legislators could endorse collectively. In Maine, having a Republican push the bill forward may have helped bridge the partisan gap (and gain the Republican Governor's support on the bill) to lead to a partial passage with a compromised labeling law. The involvement of a knowledgeable and influential policy entrepreneur holding great political capacity in the Connecticut initiative may have helped lead Connecticut to a compromise bill as well, despite lobbying pressure from outside food industries threatening to end interstate trading of food. In Vermont there was, in a sense, the "perfect storm" of a combination of factors, including a citizen legislature, accessible legislators, history of progressive legislation, and a citizenry notorious for their "strong food and environmental ethic" (Laura, GMO 139) that led to the passage of the first and only state-level GMO labeling law. Furthermore, Vermont's advocacy coalition for labeling drew upon policy core beliefs that also addressed strengthening civic agriculture in the state by supporting sustainable agricultural practices, absent in GMO agricultural production.

Conclusion

This research, I sought to explore the policy beliefs, resources and strategies employed by advocacy coalitions in the GMO labeling movements across five Northeastern states with a diversity of policy outcomes. In addition, I analyzed the political landscape within each state and institutional structures that advanced or inhibited certain advocacy coalitions in attaining their policy goals. The results show relatively uniform policy core beliefs of the advocacy coalition for labeling and against labeling across the five states. However, the advocacy coalition for labeling in Vermont held policy core beliefs reflecting collective benefits of state-supported civic agriculture, referencing sustainable, and agro-ecological practices in farming, which were absent from other coalitions' rationales for support for a GMO label. Vermont's coalition membership containing mostly small farms and farmer advocacy groups explains why this would be one of the founding core beliefs. In a state where the public greatly values local, sustainable food systems and environmental stewardship, this policy core belief resonates and is shared by the wider public. Therefore, Vermont was able to create a broad coalition with wide public support to affect policy change, which has been deemed an effective factor in past studies on policy developments (Breton et al. 2006; Johnson et al. 2012; Ulmer et al. 2012; Steinman et al. 2017). It is important to consider that Vermont's ability to garner broad public support through articulation of civic agricultural benefits may be reflective of their relatively small population and homogenous landscape. Vermont with a population of just over 600,000 and a relatively uniform rural landscape is strikingly different from New York or Massachusetts that hold considerably larger populations and include a diversity of urban, suburban and rural areas. There are many more interests, livelihoods and beliefs to consider in these larger, more diverse states that may not be so concisely expressed or easy to achieve consensus in policy debates.

Vermont's advocacy coalition also had access to important resources in policy development and increased political capacity. Vermont's coalition had access to formal legal authority with the assistance of a law clinic, and public support, deemed legitimate resources in advocacy coalition success (Nohrstedt 2011; Pierce 2016). Vermont also contained political opportunity structures much more conducive to grassroots policy mobilization. Vermont even holds "Town Meeting Day", the first Tuesday of every March where citizens in each town come together to discuss and vote on local rules and budgets, a specific example of direct democracy at work (Markowitz 2003). Vermont's citizen legislature, accountable and responsive legislators, past progressive legislation and direct democratic processes impelled the labeling bill through the legislature to the Governor's desk for signing, compared to the other states who either never saw a floor vote or received a stagnant compromise bill.

These findings provide valuable insights into political behavior and collective action by examining how individuals advocated for or protested a government-mandated GMO label. From the perspective of policy actors and advocacy groups, this study can help inform future work in how to gain traction and support in their respective policy arena. Having an individual who understands the "inside and outside game," gaining bipartisan support on a bill and access to legal authority could greatly benefit advocacy groups who may be lacking in funds to hire professional lobbyists. Furthermore, forming arguments and rationales that may highlight socio-economic benefits to a community and/or state may gain better traction with legislators and activists intimately connected to their community.

Theoretically, I utilize the ACF to help describe and compare the political landscape of GMO labeling in five states within the Northeastern region. This framework has been rarely applied comparatively (Leach and Sabatier 2005; Weible et al. 2010) and this study provides an

example for future comparative research. Advocacy coalitions can vary across locations on the same issue and within the same time frame. Therefore, as this framework is applied to other policy issues nationally and globally across different topics, more comparative analysis can bring forth concepts and ideas that may be hidden within the context of a specific place. Application of comparative case studies at different scales can also illuminate interactions between local, state, national and international policy actors and how they diffuse ideas and strategies. As GMO labeling policy continues to evolve at the national and state level, understanding the past political processes, influences, and barriers to certain coalitions can help inform policymakers, stakeholders and interested citizens wishing to engage in and influence GMO labeling or other agri-food policy in the future.

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Chapter 5: Synthesis of Results and Conclusion

Overview and Corroborated Findings

This dissertation project attempted to understand how stakeholders and the public framed the issue of genetic modified organisms (GMOs) and policy surrounding the labeling of GMOs. With the recent passage of a state followed by a federal GMO labeling bill, the political arena has seen a burst of activity surrounding the regulation and labeling of GMOs that creates a unique time and place in history to be studying the discursive and external influences on the policy process. While there has been extensive study on the discourse surrounding GMO regulation at the national and global level (Colina and Montpetit 2018; Binimelis and Myhr 2016; Kinchy et al. 2008; Kleinman and Kinchy 2003a; 2003b) and analysis of small-scale, county-level social movements on GMO moratoriums (Gupta 2018; Pechlaner 2012; Walsh-Dilley 2009), a gap in the literature remained on the evolution of GMO discourse on labeling at the federal level and in-depth comparative case studies on recent GMO labeling policy development at the state level. My approach here has been to analyze and understand the various influences (internal and external) that led to a diversity of outcomes in GMO labeling policy at the national and state scale.

Studies on the analysis of discursive influences on GMO policy development nationally and globally greatly informed how I approached the analysis of discourse on GMO regulation and labeling in the U.S. congressional committee hearings, considering concepts of scientism, neoliberalism and scientization in biotechnology policy development (Colina and Montpetit 2018; Bruce 2017; Wenzelburger and Kong 2017; Maeseele 2010; Glover 2010; Newell 2009; Kinchy et al. 2008; Kleinman and Kinchy 2007; Levidow et al. 2007; McAfee 2003). These

authors have contended that in biotechnology policy discussions and in the final regulations, scientific evidence and experts will prevail while socio-economic considerations of the technology are dismissed or deemed irrelevant in policy discussions. My findings corresponded to findings in these previous studies specifically in the evocation of "scientism" and subsequent result of scientization in GMO policy development. In Chapter 2, I found throughout all three sessions of Congress that proponents of GMOs continued to rationalize that there was no need for increased regulation or labeling of GMOs due to the scientific evidence demonstrating safety. Proponents continued to evoke the tenets of scientism through "depoliticizing" the issue of GMOs by identifying scientific evidence demonstrating no increased risk of harm from consuming GMOs, thus eliminating GM agriculture from political debate. This was especially evident in earlier sessions of Congress where GMO proponents also warned of the tenuous leadership position the U.S. held in biotechnology innovation and development, who suggested that if the government were to call for increased regulation of GMOs, this would only hinder further investment in biotechnology development for the country, causing it to "fall behind" in global biotechnology development competition. This discourse of scientific optimism and importance of innovation leadership has been found in analyses of other countries' policies toward GMO liberalization (Colina and Monteptit 2018; Wenzelburger and Kong 2017). However, in the later sessions of Congress, I found through my analysis that the scientism rhetoric began to be accompanied by consideration of socio-economic impacts of the technology (profits/losses for farmers, consumer knowledge/confusion, information access/loss) by opponents *and* proponents of the technology. While past studies had found that scientism trumped and completely eliminated discussion of socio-economic concerns with biotechnology, here both were argued concurrently. Specifically in the later sessions of Congress (113 and 114),

I found that these socio-economic considerations *mattered*. Opponents of GMOs in general and those in support of GMO labeling framed the majority of their arguments in terms of consumer rights (a right to know, uniformity in labeling, access to information). Previously in the 112 Congress, opponents of GMOs called for more scientific studies and broader oversight and increased regulations. These arguments were completely abandoned in favor of transparency and rights of consumers. Proponents of GMOs and opponents to labels followed this same change in framing by emphasizing the economic risks with a label (specifically increased costs for farmers and food prices for consumers) and heightened consumer confusion with a label. Consumer interests and economic concerns then became the focal points of debate within the Congressional hearings and were the main considerations in the passage of S.764, The Biotech Labeling Solutions Act that emerged from these hearings.

Scholars have argued that policies at the state level likely lead to similar changes at the federal level (Clark et al. 2014; Wohlers 2013). In this study we also see that rhetoric and discourse utilized at the state level was "scaled up" to attempt a similar national level policy change. It is evident when examining the discourse from the state-level debates on GMO labeling that activists attempted to use the similar frame of a "consumer's right to know" when advocating for a federal mandated label. Results from Chapter 3 and 4 demonstrated that "consumer right to know" was the most popular frame GMO labeling supporters drew upon across all five states (derived from public testimony and interviews with stakeholders). Chapter 2 also indicated that when GMO labeling arose on the federal political agenda due to grassroots consumer movements and ballot initiatives occurring in the West in the early 2010s, a "consumer right to know" became a prominent argument for labeling on the federal level as well. In this case, state social movements served as laboratories to test the effect of particular discourses and

framings to equate policy change. The "consumer right to know" frame was a rallying cry at the state level and the federal level, also the most popular frame utilized by supporters of GMO labeling in the later sessions of Congress.

However, we saw in my comparative case study of frames in the GMO labeling movements in Chapter 3 that a "consumer right to know" frame was not the stand-alone discursive influence for policy passage. Vermont GMO labeling movements drew upon additional frames that emphasized the socially-embedded local agricultural production within the state and the subsequent threats to this communal identity and livelihood from GM production within the state, which Lyson (2004) has coined "civic agriculture." In Vermont, GM agriculture was tied to corporate domination, greed and an environmentally damaging form of monoculture agriculture. A GMO labeling bill was not seen as just a form of consumer access to information but rather a democratic stance against corporate greed and corruption. These findings support similar results found in county-level GMO bans in California, Hawaii and rural areas in Europe where activists framed GMOs has a social problem that could negatively affect their locally-embedded organic agriculture (Gupta 2018; Pechlaner 2012; Walsh-Dilley 2009; Stephan 2015; Levidow and Boschert 2008). For these cases, activism discourse focused on the detrimental community impacts from the planting of GMOs whether that be the loss of profits for local farmers due to GM contamination, loss of cultural and native seed varieties or the devaluing of community rural identity and/or livelihood founded upon its local agricultural food production. Stephan (2015) wrote in his comparative analysis of GMO regulation between the U.S. and Europe that Europe's rejection of GM technology is associated with their deep-rooted agricultural traditions and food cultures. Activists in Europe linked GM foods and crops to the decline of the family farm and the spread of fast food (Ansell et al. 2006; Kurzer and Cooper

2007), which resonated well with European citizens that embrace regional food production systems and traditions (Stephan 2015). Comparatively, the majority of Americans have a utilitarian attitude towards food and are most concerned with health, diet, nutrition and a clean environment, all aspects that can be achieved through biotechnology (Stephan 2015). Hence resistance to GM production in Europe compared to the U.S. can also be attributed to differences in cultural identity tied to food and landscape. Stephan (2015) notes that the recent upsurge in GM resistance in New England states can be associated with stronger identification with food and agriculture, since New England is more reminiscent of Europe compared to the rest of the U.S. (Tokar 2009). My findings in this study corroborate this conclusion since Vermont's strong food and environmental ethic linked to their local alternative agricultural production created a cultural identity threatened by the proliferation of GM crops. Vermont activists were able to frame GMOs as a social-environmental-economic risk that resonated well within the community that valued the local, alternative small-scale agricultural production. This analysis also demonstrated that this type of discourse can have political ramifications as well as Vermont was the only state to pass a GMO labeling bill. In other states, activist frames did not draw on these social-environmental-economic concerns as readily, most likely due to the lack of cultural resonance it would have had in the state.

Chapter 4 of this research study utilized the Advocacy Coalition Framework (ACF) to consider other factors besides discourse and framing that may have been influential in the passage of a state-wide GMO labeling bill. This study evaluated the four major principles of the ACF in each state (a coalition's structure, shared belief system, political capacity and the political landscape within each state) to understand how they influenced a state's passage or failure of a GMO labeling bill. My findings support similar research that has drawn on the ACF

to find that that broader coalitions are more successful in reaching a larger audience and building wider support (Breton et al. 2006; Johnson et al. 2012; Ulmer et al. 2012) and that a coalition's increased access to resources, legal authority and public support (i.e. political capacity) increased likelihood of success (Kubler 2001; Sabatier and Weible 2007; Nohrstedt 2011; Pierce 2016; Weible and Heikkila 2016; Steinman et al. 2017). The policy studies literature has established that social movement success or failure is dependent upon the political opportunity structures within each subsystem (local, statewide, regional, national) (McAdam et al. 1996; Kubler 2001; Giugni and Grasso 2016; Cisar 2017) and I found that a political landscape that included a citizen legislature with increased access for citizens to be active in statewide policy change is more amenable to grassroots progressive policy change. Furthermore, legislators who are closely tied to their home communities (i.e. they are present in their home districts often, like Vermont legislators who only spend a little over half a year at the state capitol) will also be more attuned to needs and wants of their constituents and first and foremost may identify as a citizen over a legislator. As Zurkek (2007) states, "Policymakers will often respond to existing cultural or political preferences either because they feel compelled to do so for electoral reasons or because they broadly share the public's concerns" (as quoted in Stephan 2015: 126). For Vermont legislators, the latter appears likely as many interviewed shared the same sentiments as citizens for the want of a label. When cultural identities and values can permeate throughout the community coupled with institutions amenable for civic engagement, political activism can gain traction and evoke change.

There is concern in the study of food politics that activism focused on consumer rights, freedom of choice and purchasing power could increase "individualization of responsibility" (Maniates 2001) within a movement and have little impact on the greater social and

environmental systemic problems within food systems currently (Szasz 2007; Skocpol 2003; Guthman 2003; 2004a; b; 2007; Hinrichs 2000; Sclove 2000). How can those claims be addressed with findings from this study? This dissertation research demonstrates that frames focused on consumer rights and freedom of choice in the marketplace *did resonate* well with the public and became the focal point of social movements across the Northeastern states and nationally. However, these findings also demonstrate that framings tied to empowering consumers do not stand alone and in the state movements were not enough to warrant policy change. When GM agriculture was considered a social threat to a state population, these frames were more powerful and impactful at the state level. Moreover, throughout the rest of the states, while consumer rights was the most popular frame utilized, many states discussed environmental, human health and social risks from GMOs as well. While a labeling law ultimately increases the power of the consumer in their purchasing decisions, citizens drew upon non-economic and non-consumer power reasons for the demand for a label and thus brought forth social, public health and environmental concerns. By and large this labeling movement increased awareness about many risks identified with GMOs (social, environmental, economic, moral, ethical, public health) that could be pursued further through different policy avenues. Many representatives of activist organizations I interviewed stated that now that GMO labeling would move to federal responsibility (with the passage of S.764 preempting state laws), they were going to shift their focus to mobilization against the dangers of pesticides (one of the main environmental and public health risks associated with GMOs). Activism for decreasing pesticides will likely be tied to GMOs, and the previous labeling movements may help build a strong activist base for the future anti-pesticide movement as well. And to the point that movements focused around "conscientious consumerism" (Bartley et al. 2015) could cause

"political anesthesia" (Szasz 2007), one could look to the state activists' marches, public demonstrations and public hearings focused on the dangers of GMOs and the need for labels. Citizens were just as politically engaged as ever in these labeling movements and their participation in this movement may encourage future participation in solving some of the other broad structural problems associated with GMOs in movements down the line.

Concluding Thoughts

Moving forward, I think another interesting point drawn from this study is a reflection on the prevalence of scientism and scientization within policy discussions and policy development concerning biotechnology. We saw in Chapters 2 and 3 that scientism is still present in policy discussions concerning biotech even when social and economic issues are discussed as well. In both the national and state debates, GMO proponents stated there was enough scientific research to warrant deregulation, while opponents called for more scientific research to prove safety. There appears to be an irreconcilable tension when debating the merits and breadth of scientific studies. While more science is meant to reduce uncertainty about a particular phenomenon, this notion can be misguided (Sarewitz 2004). By implicating that uncertainty can be reduced with more scientific research, "the scientific community assures that the phenomenon of uncertainty remains located in our imperfect (but always-improving) understanding of nature, and not an attribute of nature itself" (396). The result is that we have debates where individuals from each side of the aisle talk past one another, relying on similar arguments and never reaching a true consensus or understanding. Debates about scientific merit on GMOs seem to get us nowhere. For example, the documentary Food Evolution was released in 2017 which explored the controversy surrounding GMOs, food, the "emotions and the science driving one of the most

heated arguments of our time" (iTunes 2018). Critics noted its "soft tone, respectful to opponents but insistent on the data…'Food Evolution' posits an inconvenient truth for organic boosters to swallow: In a world desperate for safe, sustainable food, GMOs may well be a force for good" (Gold 2017). GMO opponents were not convinced stating, the movie "ignore[s] any science/scientists that oppose them [GMOs]" (Kimbrell 2017) and "This film's credibility suffers from their choice to embrace only the science and scientists who side with the chemical industry players who profit from GMOs and their chemicals used on them, while ignoring science and data that doesn't fit that agenda" (Malkan 2017). I think the most notable point was made by Keith Floor from *Slate:* "This film is an attempt to inject science into a debate that is shaped by values" (2017). As we saw in this research study, individuals care about the social and economic concerns with GMOs and citing these concerns while invoking cultural values into policy debates can make change happen. If opponents only focused on the lack of science and if proponents only focused on the mass volume of science, we would be stuck in a political standstill. Bruce's recent study (2017) evaluated the discourse surrounding the Food and Drug Administration (FDA) approval of the AquaAdvantage salmon (the first GM fish) for consumption. She found regulatory debates to be dominated by scientism and the public was even instructed to not address economic, social, environmental or human health issues outside of the legal, scientific framework in their comments. The fish was ultimately approved and Bruce contends that the public's rejection to the technology may be due to the scientistic practices of the FDA, as the public distrusts these institutions and industry, rather than the technology itself (Freudenburg 1988; Lang and Hallman 2005; Sapp et al. 2013; Bruce 2017). If the public are citing broader risks with the technology outside of the purely scientific framework, then how can

they trust a government agency that only makes regulatory decisions solely based on a scientific framework?

Debates about GMOs *are* debates about values, and policy discussions related to biotechnology are starting to address these socio-economic concerns. It may be prudent for both sides of the issue to abandon discussions related to the science and instead focus on the issues up for political discussion: the social, environmental, economic, ethical and moral implications with GMOs. This would also broaden the discussion to differentiate between GMOs created through public-sector science (and therefore not tied to corporate firms), or that address specific public health crises (such as nutrient deficiencies or drought-resistance) while still considering the social and cultural implications of each of these. By legitimizing these values within political debates, equity and justice can be considered in future decisions related to biotechnology. This dissertation research project demonstrates that socio-economic considerations matter for the public and when tied to cultural values and identities, they can have greater resonance throughout the community and can evoke policy change.

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Appendix A. Interview Contact Letter

Hi [Name],

My name is Sara Velardi and I am a PhD student at the State University of New York College of Environmental Science and Forestry (SUNY-ESF). My research is focused on GMO labeling at the state and federal level. For the last couple of years I have been following the state labeling initiatives in the Northeast and conducting interviews with different activist organizations, environmental groups, consumer rights groups and farmer groups to learn about the work they did, why they wanted labeling and their thoughts on the new federal bill that just passed.

] If possible I would really appreciate the opportunity to chat with you to hear about the work your organization has done on the issue your thoughts on labeling.

Thank you very much for your time!

Sara Velardi
PhD Candidate in Environmental and Natural Resource Policy
State University of New York College of Environmental Science and Forestry
Syracuse, NY 13210

Appendix B. Informed Consent for Interviews

You have been invited to take part in an interview about your organization's role in the state-wide GMO labeling initiative. This interview is for a dissertation research project focused on the role of citizen activist groups in social movements for GMO labeling. You will be asked questions about the role you and your organization took in the initiative and partnerships you formed with other organizations. Your participation in this interview is completely voluntary and you can withdraw from this study at any time without penalty. Individual identifying information will be kept confidential. If you have any questions about this research you may contact Sara Velardi at shvelard@syr.edu. By agreeing to participate in this interview you indicate that you understand the information I have read to you, you voluntarily agree to participate and you are least 18 years of age.

Would you like to participate in the interview?

Appendix C. Complete List of Interviews

Code	Pseudonym	State/ Federal	Organization type	Stance on GMO State Labeling
GMO 101	Brianna	CT	Labeling Advocacy	Proponent
GMO 102	Jamie	CT	Labeling Advocacy	Proponent
GMO 103	Ann	CT	Legislator	Proponent
GMO 104	Aaron	CT	Organic Farmer Advocacy	Proponent
GMO 105	Diana	CT	Farmer Advocacy	Opponent
GMO 106	Christopher	CT	Biotechnology Advocacy	Opponent
GMO 107	Angela	MA	Consumer Advocacy	Proponent
GMO 108	Don	MA	Labeling Advocacy	Proponent
GMO 109	Peter	MA	Legislator	Proponent
GMO 110	Eli	MA	Organic Farmer Advocacy	Proponent
GMO 111	John	MA	Food Producer, Manufacturer, Retailer Advocacy	Opponent
GMO 112	Jill	ME	Environmental Policy Advocacy	Proponent
GMO 113	Carl	ME	Farmer Advocacy	Proponent
GMO 114	Jessica	ME	Farmer Advocacy	Proponent
GMO 115	Bob	ME	Farmer, Farmer Advocacy	Proponent
GMO 116	Justin	ME	Legislator	Proponent
GMO 117	Mary	ME	Organic / Farm Advocacy	Proponent
GMO 118	Rachel	ME	Food Producer, Manufacturer, Retailer Advocacy	Opponent
GMO 119	Dan	ME	Food Producer, Manufacturer and Retailer Advocacy	Opponent
GMO 120	Emma	NY	Consumer Advocacy	Proponent
GMO 121	Krista	NY	Environmental Advocacy	Proponent
GMO 122	Paul	NY	Environmental Advocacy	Proponent
GMO 123	Ellen	NY	Environmental Advocacy	Proponent
GMO 124	Heather	NY	Labeling Advocacy	Proponent
GMO 125	Betty	NY	Organic Farmer Advocacy	Proponent
GMO 126	Barbara	NY	Legislator	Proponent
GMO 127	Jackson	NY	Food Industry Advocacy	Opponent
GMO 128	George	NY	Farmer Advocacy	Opponent
GMO 129	Alexandra	NY	Farmer Advocacy	Opponent

GMO 130	Bill	VT	Consumer Advocacy	Proponent
GMO 131	Helen	VT	Farmer/Environmental Advocacy	Proponent
GMO 132	Kate	VT	Farmer/ Environmental Advocacy	Proponent
GMO 133	Joe	VT	Farm / Farmer Advocacy	Proponent
GMO 134	Vicki	VT	Law Advisory	Proponent
GMO 135	Tom	VT	Legislator	Proponent
GMO 136	Kevin	VT	Legislator	Proponent
GMO 137	Beth	VT	Legislator	Proponent
GMO 138	Joanne	VT	Legislator	Proponent
GMO 139	Laura	VT	Organic Farmer Advocacy	Proponent
GMO 140	Fred	VT	Farmer Advocacy	Opponent
GMO 141	Michael	VT	Food Producer, Manufacturer, Retailer Advocacy	Opponent
GMO 142	Taylor	National	Environmental Advocacy	Proponent
GMO 143	Denise	National	Environmental Advocacy	Proponent
GMO 144	Brayden	National	Environmental/Consumer Advocacy	Proponent
GMO 145	Jennifer	National	Biotechnology Industry	Opponent
GMO 146	Carson	National	Science Advocacy	Opponent
GMO 147	Andrew	National	Biotechnology Advocacy	Opponent
GMO 148	Karen	National	Biotechnology Advocacy	Opponent
GMO 149	Conner	National	Biotechnology industry	Opponent
GMO 150	Ben	National	Farmer Advocacy	Opponent
GMO 151	Ron	National	Food Industry	Neutral
GMO 152	Tom	National	Food Industry	Neutral
GMO 153	Brian	National	Food Industry	Neutral
GMO 154	Leonard	National	Industry	Neutral
GMO 155	Alexandra	National	Science Advocacy	Neutral
GMO 156	Phil	National	Third Party certification	Neutral

Appendix D. Interview Protocol

1) Can you describe how your organization became involved in the GMO labeling debate?

2) When did this occur?

3) What are some reasons as to why_ wants GMO labeling?

4) Was there a particular trigger event or impetus for involvement in the issue?

5) Has _ _ been involved in other labeling coalitions or any anti-GM movements in the past?

6) Did you have a personal reason for involvement in the issue?

7) What do you think are some of the main issues with GMO labeling?

8) What is your overall policy goal (label or elimination)?

9) Does your organizations advocate for voluntary labels or mandatory? Would you be satisfied with one over the other? Do you think either/or has different meanings?

1 0) Is there something or someone you are fighting specifically against or for? i.e. an issue?

11) What are the best methods (arguments and action) you believe are the way to achieve your goals?

12) Who is your target constituency?

13) Did you work with any specific politicians on the issue?

14) Did you work with any other organizations on the issue?

15) Are there some organizations you wished were more involved?

16) Do you have partnerships with organizations in other states for GMO labeling or did you look to other states for guidance or advice?

17) Have you worked with any corporations on the GMO issue? Is that of interest?

18) How large is your organization?

19) How exactly did you get members involved? How did you promote individual action?

20) For New York organizations only: You just had a march in Albany for GMO labeling, how did you say it went?

21) What do you think about the future of GMO labeling, do you see this becoming a nation-wide issue?

Appendix E. Coding scheme and data summary for Congressional hearings

Support for GMOs

	112th Congress (2011-2012)					113th Congress (2013-2014)						114th Congress (2015-2016)							
Coding scheme	Total %	Academic %	Farmer %	Industry %	Legislators %	Total %	Academic %	Farmer %	Industry %	Government %	Legislator %	Total %	Academic %	Farmer %	Industry %	NGO %	Government %	Medical Doctor %	Legislator %
Support for GMOs	100	15.3	15.3	30.8	38.5	100	16.0	8.0	8.0	4.0	64.0	100	1.9	5.8	11.5	7.7	7.7	1.9	63.5
Benefits of GMOS																			
Environmental – decreased pesticides, soil erosion	11.2	5.2	16.0	11.0	22.7	8.3	10.0	16.7	2.8	0	6.6	8.2	11.5	7.5	5.1	9.7	12.1	9.1	9.1
Farmer – increase farmer profits, farmer choice	8.1	6.5	20.0	2.8	13.6	8.7	6.3	16.7	19.4	0	3.9	7.1	2.9	15.1	10.7	5.4	3.0	0	4.6
Food Security – feed growing populations	12.0	10.4	14.0	9.2	27.3	4.4	2.5	7.1	0	16.7	3.9	4.9	11.4	3.8	0	8.0	1.1	18.2	2.3
Economic – reduced food prices	5.8	1.3	0	4.5	4.5	2.8	5.0	2.4	0	0	2.6	1.9	2.9	0	1.7	2.2	0	0	2.9
Sustainable – agricultural land efficiency	6.6	3.9	4.0	11.0	0	4.4	6.25	2.4	0	0	6.6	2.4	11.4	3.8	0.6	2.2	0	4.5	2.3
Health – future crops could address vitamin deficiencies	1.9	3.9	4.0	0	0	0	0	0	0	0	0	3.9	2.9	1.9	1.1	9.7	0	9.1	4.6
Nutrition – can provide better nutrition for consumers	0	0	0	0	0	5.6	6.25	0	0	0	11.8	1.2	0	1.9	1.1	0	0	9.1	1.1
Trade – reduced regulation of	3.5	1.3	4.0	4.6	4.5	0	0	0	0	0	0	0.7	0	0	0.6	2.2	0	0	0.6

GMOs will help free trade																			
Global Development – help countries achieve self-sufficiency	1.9	2.6	0	2.8	0	2.0	5.0	16.7	19.4	0	3.9	0.2	0	0	0	0	0	4.5	0
Social Justice – increased food costs will affect impoverished citizens the most	0	0	0	0	0	0.4	1.3	0	0	0	0	1.5	2.9	5.7	1.7	1.1	0	0	0.6
Climate Change – GMOs will lower the carbon footprint	0	0	0	0	0	0	0	0	0	0	0	1.4	2.9	2.8	0.6	0	0	9.1	1.1
Consumer Benefits – offer accessible food types for consumers	0.8	1.3	0	0.9	4.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Biological – GM salmon will not become invasive, biological containment measures	0.8	0	0	1.8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rationales for continued support of GMOs																			
Science says they are safe	**12.0**	20.8	10.0	9.2	0	14.3	11.3	14.3	2.8	16.7	22.4	12.1	20.0	11.3	5.6	12.9	15.2	13.6	16.0
Importance of innovation	19.8	27.3	14.0	17.4	18.2	7.1	13.8	2.4	0	0	7.9	6.3	11.4	5.7	6.2	5.4	6.1	0	6.9
Deception by opponents of GMOs	0	0	0	0	0	0	0	0	0	0	0	2.9	14.3	3.8	0	6.5	0	0	2.3
We can control the technology	4.3	0	0	10.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Perspective on GMO Labels																			
Economic – label increases costs	0	0	0	0	0	10.3	6.3	9.5	27.8	0	9.2	10.7	0	13.2	23.2	0	0	0	8.6
Consumer Rights –transparency important, but label will	0.4	0	0	0.9	0	7.1	5.0	9.5	13.9	5.6	5.3	8.2	0	3.8	13.6	2.2	3.0	0	10.9

decrease consumer choice, organic label exists																			
Uniformity –state labels confusing	0	0	0	0	0	8.7	0	7.1	16.7	33.3	9.2	7.3	0	7.5	11.9	2.2	3.0	0	8.6
If label – needs to be only information	0	0	0	0	0	0	0	0	0	0	0	0.9	0	0	0	2.2	0	0	1.7
A non-GMO label gives market access	0	0	0	0	0	0	0	0	0	0	0	1.7	0	1.9	1.7	0	9.1	0	1.7
GMO label unnecessary but states' rights matter	0	0	0	0	0	0.4	0	0	0	0	1.3	0	0	0	0	0	0	0	0
Solutions / Perspective on future regulations surrounding GMOS																			
Need to provide accessible information to public about GMOs	0	0	0	0	0	7.5	12.5	9.5	0	0	6.6	5.1	5.7	7.5	1.1	8.6	9.1	9.1	5.1
Regulations – keep same	0.8	0	0	1.8	0	4.4	1.3	2.4	8.3	27.8	1.3	4.8	0	1.9	0.6	12.9	27.3	13.6	1.1
Regulations – lessen	9.3	16.9	14.0	2.8	4.5	2.0	6.3	0	0	0	0	0	0	0	0	0	0	0	0
Regulations – voluntary labels	0	0	0	0	0	0	0	0	0	0	0	2.7	0	0	6.8	2.2	0	0	1.1
Regulations – strengthen, mandatory premarket testing	0	0	0	0	0	0.4	1.3	0	0	0	0	1.9	0	0	1.1	9.7	0	0	0
Educate the public	0	0	0	0	0	0	0	0	0	0	0	0.9	0	0	0	2.2	3.0	0	1.1
Corporate concentration risks if regulations too expensive	0	0	0	0	0	1.2	0	0	8.3	0	0	0.9	0	0	2.8	0	0	0	0
Need more public input	0.8	0	0	1.8	0	0	0	0	0	0	0	0.5	0	0	0	0	9.1	0	0

Opposition to GMOs

	112th Congress (2011-2012)					113th Congress (2013-2014)				114th Congress (2015-2016)			
Coding scheme	Total %	Academic %	Government %	Author %	Legislators %	Total%	Government%	NGO %	Legislators %	Total %	Industry %	Government %	Legislators %
Opposition to GMOs	100	25	12.5	12.5	50	100	25	25	50	100	16.6	16.6	66.8
Risks with GMOS													
Environmental – increased herbicides, resistance	5.9	5.7	0	0	11.8	12.7	0	18.9	0	12.3	18.8	11.4	9.1
Salmon industry – GM salmon could hurt the wild salmon industry	8.1	4.3	28.6	16.7	5.9	0	0	0	0	0	0	0	0
Sustainable – GMOs will not address sustainability, we need to focus on other agricultural solutions	5.2	2.9	0	8.3	2.9	0	0	0	0	0	0	0	0
Health – GMOs linked to illnesses	0.7	0	14.3	0	0	1.8	0	2.7	0	6.8	18.8	2.9	4.5
Biological – GMO species could become invasive	4.4	2.9	14.3	0	8.8	0	0	0	0	0	0	0	0
Economic – Managing GMOs will increase taxpayers costs	3.0	2.9	0	8.3	0	0	0	8.3	1.5	0	0	0	0
Trade – certain countries do not biotech, could hurt trade	3.0	1.4	0	8.3	2.9	0	0	0	0	0	0	0	0
Farmer – farmers lose agency, forced to buy from large companies	0	0	0	0	0	0	0	0	0	2.7	6.3	2.9	0
Organic Industry – contamination issues; could hurt organic farmers	0.7	0	0	0	2.9	0	0	0	0	1.4	0	0	4.5
Religious – certain religions do not support changing composition of living things	0	0	0	0	0	1.8	7.7	0	0	1.4	0	2.9	0
Rationales for opposition to GMOs													
Lack of scientific evidence	10.4	14.3	0	4.2	8.8	1.8	0	2.7	0	0	0	0	0
We cannot control the technology	8.1	8.6	0	0	14.7	0	0	0	0	0	0	0	0
GE is not the answer	7.4	1.4	0	33.3	2.9	0	0	0	0	0	0	0	0
Deception by GMO supporters	0	0	0	0	0	0	0	0	0	1.4	0	0	4.5
Perspective on GMO													

Labels													
Consumer Rights – Right to Know	3.0	1.4	14.3	8.3	0	36.4	61.5	24.3	60.0	23.3	18.8	17.1	36.4
Information on label only	0	0	0	0	0	9.1	15.4	8.1	0	13.7	12.5	22.9	0
Uniformity – with federal label	0	0	0	0	0	10.9	7.7	10.8	20.0	6.8	12.5	0	13.6
States' rights – support state label	0	0	0	0	0	3.6	7.7	2.7	0	11.1	0	22.9	0
Economic – label will not increase prices	0	0	0	0	0	5.5	0	8.1	0	9.6	12.5	8.6	9.1
Innovation will not be affected by a label	0	0	0	0	0	9.1	0	10.8	20.0	0	0	0	0
Democracy – public wants label	0	0	0	0	0	0	0	0	0	4.1	0	5.7	4.5
Labels help a market economy	0	0	0	0	0	5.5	0	8.1	0				
Solutions / Perspective on future regulations surrounding GMOS													
Need greater oversight in approval of GMOs	23.7	35.7	14.3	4.2	14.7	0	0	0	0	0	0	0	0
Need to be more cautious in approval of GMOs	11.1	14.3	0	12.5	5.9	0	0	0	0	0	0	0	0
Need more public input	5.2	4.3	14.3	0	8.8	0	0	0	0				
Need to provide accessible information to public about GMOs	0	0	0	0	0	1.8	0	2.7	0	2.7	0	0	9.1
Educate the public	0	0	0	0	0	0	0	0	0	1.4	0	2.9	0
Regulations – other countries label, we should	0	0	0	0	0	0	0	0	0	1.4	0	0	4.5

Appendix F. Name and affiliation of witnesses invited to testify at Congressional hearings related to the regulation and labeling of biotechnology in the food system

Name	Self-identified Affiliation	Coded Affiliation	Type of testimony given	Hearing(s) testified
Charles Conner	President and Chief Executive Officer of the National Council of Farmer Cooperatives, Washington DC	Farmer	Oral and written	How to Review the Opportunities and Benefits of Agricultural Biotechnology (2011)
Roger Beachy	President Emeritus, Donald Danforth Plant Science Center, Professor of Biology, Washington University in St. Louis, St. Louis, WA	Academic	Oral and written	How to Review the Opportunities and Benefits of Agricultural Biotechnology (2011)
Calestous Juma	Professor of the Practice of International Development, Belfer Center for Science and International Affairs, John F. Kennedy School of Government, Harvard University, Cambridge, MA	Academic	Oral and written	How to Review the Opportunities and Benefits of Agricultural Biotechnology (2011) & Hearing to Consider the Societal Benefits of Biotechnology (2014)
Biotechnology Industry Organization	Biotech Trade Association	Industry	Written	How to Review the Opportunities and Benefits of Agricultural Biotechnology (2011) & Environmental Risks of Genetically Engineered Fish (2011)
CropLife America	National trade association representing manufacturers, formulators and distributors of pesticides	Industry	Written	How to Review the Opportunities and Benefits of Agricultural Biotechnology (2011)

National Corn Growers Association	Represents corn growers nationwide	Farmer	Written	How to Review the Opportunities and Benefits of Agricultural Biotechnology (2011)
Ron L. Stotish	President and CEO, Aquabounty Technologies, Inc.	Industry	Oral and written	Environmental Risks of Genetically Engineered Fish (2011)
John Epidanio	Fish Conservation Geneticist, Illinois Natural History Survey and University of Illinois	Academic	Oral and written	Environmental Risks of Genetically Engineered Fish (2011)
George H. Leonard	Aquaculture Program Director, Ocean Conservancy	Academic	Oral and written	Environmental Risks of Genetically Engineered Fish (2011)
Paul Greenburg	Author of "Four Fish: The Future of the Last Wild Food"	Author	Oral and written	Environmental Risks of Genetically Engineered Fish (2011)
Sean Parnell	Governor of Alaska	Government	Written	Environmental Risks of Genetically Engineered Fish (2011)
David Just	Professor, Co-Director, Cornell Center for Behavioral Economic in Child Nutrition Programs, Charles H. Dyson School of Applied Economics and Management, Cornell University, Ithaca, NY	Academic	Oral and written	Hearing to Consider the Societal Benefits of Biotechnology (2014)
Olga Bolden-Tiller	Associate Professor, Animal Science, Tuskegee University, Tuskegee, AL	Academic	Oral and written	Hearing to Consider the Societal Benefits of Biotechnology (2014)
Joanna Lidback	Owner, The Farm on Wheeler Mountain, Westmore, VT on behalf of Agri-Mark, Inc., National Council of Farmer Cooperatives	Farmer	Oral and written	Hearing to Consider the Societal Benefits of Biotechnology (2014) & Examination of the Costs and Impacts of Mandatory Biotechnology Labeling Laws (2015) & Agriculture Biotechnology: A Look at Federal Regulation and Stakeholder Perspectives (2015)
Michael M. Landa	Director, Center for Food Safety and Applied Nutrition, U.S. Food and Drug Administration (FDA)	Government	Oral and written	Examining FDA's Role in the Regulation of Genetically Modified Food Ingredients (2014)

Alison Van Eenennaam	Cooperative Extension Specialist, Animal Genomics and Biotechnology, Department of Animal Science, University of California, Davis	Academic	Oral and written	Examining FDA's Role in the Regulation of Genetically Modified Food Ingredients (2014)
Scott Faber	Senior Vice President of Government Affairs, Environmental Working Group	NGO	Oral and written	Examining FDA's Role in the Regulation of Genetically Modified Food Ingredients (2014)
Kate Webb	Assistant Majority Leader, VT House of Representatives	Government	Oral and written	Examining FDA's Role in the Regulation of Genetically Modified Ingredients (2014)
Stacy Forshee	Fifth District Director, Kansas Farm Bureau	Farmer	Oral and written	Examining FDA's Role in the Regulation of Genetically Modified Food Ingredients (2014)
Tom Dempsey	President and CEO, Snack Food Association	Industry	Oral and written	Examining FDA's Role in the Regulation of Genetically Modified Food Ingredients (2014) & Examination of the Costs and Impacts of Mandatory Biotechnology Labeling Laws (2015)
Corn Refiners Association	Trade association representing the corn refining industry (corn starch, corn oil, corn syrup)	Industry	Written	Examining FDA's Role in the Regulation of Genetically Modified Food Ingredients (2014)
David B. Schmidt	President and Chief Executive Officer, International Food Information Council and Foundation, Washington, DC	NGO	Written and oral	Examination of the Costs and Impacts of Mandatory Biotechnology Labeling Laws (2015)
Nina Fedoroff	Senior Science Advisor, Olsson Frank Weeda Terman Matz (OFW Law), Washington, DC	Academic	Written and oral	Examination of the Costs and Impacts of Mandatory Biotechnology Labeling Laws (2015)

Lynn Clarkson	President and Founder, Clarkson Grain Company, Inc., Cerro Gordo, IL	Industry	Oral and written	Examination of the Costs and Impacts of Mandatory Biotechnology Labeling Laws (2015)
Chris Policinski	President and Chief Executive Officer, Land O'Lakes, Inc., Arden Hills, MN	Industry	Oral and written	Examination of the Costs and Impacts of Mandatory Biotechnology Labeling Laws (2015)
Scott McGinty	President, Aurora Organic Dairy	Farmer	Written	Examination of the Costs and Impacts of Mandatory Biotechnology Labeling Laws (2015)
Rick Blasgen	President and Chief Executive Officer, Council of Supply Chain Management Professionals	Industry	Oral and written	Biotechnology Food Labeling Standards (2015)
Todd Daloz	Assistant Attorney General, State of VT	Government	Oral and written	Biotechnology Food Labeling Standards (2015)
L. Val Giddings	Senior Fellow, Information Technology & Innovation Foundation	NGO	Oral and written	Biotechnology Food Labeling Standards (2015)
John Reifsteck	Chairman of the Board and President, GROWMARK, Inc.	Industry	Oral and written	Biotechnology Food Labeling Standards (2015)
Gregory Jaffe	Biotechnology Project Director, Center for Science in the Public Interest	NGO	Oral and written	Biotechnology Food Labeling Standards (2015) & Agriculture Biotechnology: A Look at Federal Regulation and Stakeholder Perspectives (2015)
Craig Morris	Deputy Administrator of Livestock Poultry and Seed Program, Agricultural Marketing Service, US Department of Agriculture, Washington, DC	Government	Oral and written	Hearing to Review USDA Marketing Programs (2015)
Michael Gregoire	Associate Administrator, Animal and Plant Health Inspection Service, US Department of Agriculture, Washington, DC	Government	Oral and written	Agriculture Biotechnology: A Look at Federal Regulation and Stakeholder Perspectives (2015)

William Jordan	Deputy Director, Office of Pesticide Programs, US Environmental Protection Agency, Washington, DC	Government	Oral and written	Agriculture Biotechnology: A Look at Federal Regulation and Stakeholder Perspectives (2015)
Susan Mayne	Director, Center for Safety and Applied Nutrition, Food and Drug Administration, College Park, MD	Government	Oral and written	Agriculture Biotechnology: A Look at Federal Regulation and Stakeholder Perspectives (2015)
Daryl Thomas	Senior Vice President, Herr Foods, Inc., Nottingham, PA	Industry	Oral and written	Agriculture Biotechnology: A Look at Federal Regulation and Stakeholder Perspectives (2015)
Gary Hirschberg	Chairman and Co-Founder, Stoneyfield Farm Inc., Concord, NH	Industry	Oral and written	Agriculture Biotechnology: A Look at Federal Regulation and Stakeholder Perspectives (2015)
Ronald Kleinman	Physician in Chief, Mass General Hospital for Children, Boston, MA	Medical doctor	Oral and written	Agriculture Biotechnology: A Look at Federal Regulation and Stakeholder Perspectives (2015)

Appendix G. Coding scheme and data summary for public statewide hearings

Coding scheme	Total %	ME %	MA %	VT %	CT %
% of total observations	100	11.1	32.5	21.8	34.4
Support for GMO label and general opposition to GMOs					
Risks with GMOs					
Human Health					
Critical of GMOs as a human health issue	25.18	21.79	21.30	17.65	34.71
I have a sickness/allergy	10.1	12.82	12.61	7.19	8.68
Increased pesticides are bad for human health	8.82	12.82	12.17	3.92	7.44
GMOs will create increased allergies in the future	5.69	10.26	1.74	5.23	8.26
Autism caused by GMOs	2.13	3.85	1.74	1.31	2.48
GMOs are poison	1.14	0	2.61	0	0.83
You are eating a pesticide	0.85	1.28	0.43	0	1.65
GMOs made me sick so I stopped eating them	0.71	0	2.17	0	0
When I removed GMOs from my diet I felt better	0.71	0	2.17	0	0
Agent orange dangers tied to GMOs	0.14	0	0	0	0.41
GMOs issue of food safety	0.14	0	0	0	0.41
GMOs are not healthy	0.14	0	0	0	0.41
Environmental					
Critical of GMOs on environmental grounds	9.39	16.67	8.26	8.50	8.68
Contamination risks	4.98	12.82	3.91	3.27	4.55
GMO harms wildlife	3.41	6.41	3.91	1.96	2.89
Superweeds	3.13	2.56	3.91	0	4.55
Herbicide-pesticide treadmill	2.70	3.85	2.61	0	4.13
Increased use of herbicides/pesticides	2.56	1.28	6.09	0	1.24
GMOs mess up evolution	0.28	0	0	0.65	0.41
Social Justice					
Helpless children – our duty to help "save" them	8.53	1.28	7.39	8.50	7.85
Experimentation without consent	6.11	7.69	4.35	5.23	7.85
I cannot afford organic all of the time	2.84	5.13	3.91	0.65	2.48
The GMO issue affects people more with lower socio-economic status	1.85	3.85	2.61	0	1.65
We need to protest this – we live in a democracy	0.71	0	0.43	1.31	0.83
Identify as a young child	0.43	2.56	0	0.65	0
Unfair to farmers in developing countries	0.14	0	0	0.65	0
Farmer					
Identify as a farmer – emphasize farmer expertise	7.82	12.82	1.74	16.34	6.61

Critical of GMOs on social justice issues for farmers	4.12	11.54	2.61	3.27	3.72
Farmer problems with patents	2.42	7.69	1.74	1.31	2.07
GMOs threaten the organic farming industry	1.56	0	3.91	0	0.83
Our state is beautiful and GMOs will ruin them	1.14	5.13	0	2.61	0
GMOs will negatively impact our local agriculture	0.85	1.28	0.43	1.31	0.83
GMOs create economic problems for farmers	0.28	2.56	0	0	0
Corporate Power					
Industry bullying, government needs to stand up to industry	6.40	2.56	3.48	17.65	3.31
Lack of transparency in industry	6.26	0	6.96	0.65	11.16
Corporate profits come before public safety	6.12	7.69	7.39	0.65	7.85
Corporations have too much power	4.98	5.13	5.22	6.54	3.72
Industry conducting most studies around GMOs	4.84	5.13	4.78	2.61	6.20
Benefits of GMOs are lies	2.99	0	2.61	0.65	5.79
Revolving door between government and industry	2.84	2.56	0.87	3.27	4.55
Concentration of seed/food manufacturers	2.42	6.41	2.17	1.96	1.65
Corporations have too much monetary power	2.42	1.28	1.30	4.58	2.48
Same companies produce GMOs and dangerous chemicals	0.85	1.28	0.48	1.31	0.83
Dow made Agent Orange	0.71	0	1.30	0.65	0.41
Corporations should have to prove safety	0.57	1.28	0.43	0	0.83
Don't trust companies	0.14	0	0	0	0.41
Ethical/Moral					
Cannot control the technology once its released	2.28	1.28	3.04	0	3.31
GMOs are different than traditional plant breeding	2.28	2.56	3.04	0	2.89
Seeds made in a laboratory - unnatural	1.71	0	1.74	0	3.31
Identify as a religious figure	1.0	3.85	0	1.31	0.83
Critical of GMOs on religious grounds	0.71	1.28	0.87	0	0.83
Man's domination over nature is bad	0.57	0	0	0.65	1.24
Commodification of life	0.43	1.28	0	0	0.83
GMOs are a real danger	0.43	0.43	0	0	0.83
Economic					
Critical of GMOs on economic grounds	0.85	3.85	0	0	1.24
GMOs hurt the state economy	0.28	2.56	0	0	0
Perspective on GMO Labels					
Consumer Rights					
Consumer right to know issue	52.06	66.67	50.87	38.56	57.02
Informed decision	18.07	28.21	14.35	12.42	21.90
Information/ Education/ Transparency	12.09	11.54	13.48	9.80	12.40
Choice for the consumer	8.82	5.13	13.48	3.92	8.68
Cites reading/use of nutrition label when shopping	4.13	7.69	2.61	5.88	3.31

Contentious consumerism: vote with wallets	2.42	0	3.48	0	3.72
Freedom to choose	2.42	6.41	3.91	0	1.24
A label will help retailer give what consumer wants	0.57	0	0.87	0	0.83
Labeling empowers consumers	0.28	0	0.43	0	0.41
We need labeling consumers can trust	0.28	2.56	0	0	0
Consumers need to manage risk through labeling	0.28	1.28	0.43	0	0
Democracy					
"Legislators do your job"	9.53	8.97	5.65	15.69	9.50
Calling on legislators to "do the right thing"	5.12	6.41	2.17	11.11	3.72
People have the right to know – democratic right	3.56	1.28	1.74	8.50	2.89
Community of people	3.41	2.56	0	13.73	0.41
Corporate Greed					
GE companies should be proud and want to label their food. Why don't they?	4.55	5.13	8.26	0	3.72
Economic benefits with a label					
Labeling will increase economic value for state	2.84	8.97	1.30	2.61	2.89
Labeling will not increase costs	2.70	3.85	3.91	0	2.89
Labeling means free market economy	1.14	0	3.48	0	0
Food labels already exist – just add GMO	0.85	0	2.17	0	0.41
Changing labels and packages always happens – adding a GMO label will not be a big change for companies	0.71	0	2.17	0	0
Labeling increases company revenue	0.57	2.56	0	0.65	0.41
More difficult to sell internationally without a label	0.57	1.28	0.43	0	0.83
Labeling will reduce healthcare costs	0.43	0	1.30	0	0
Labels create a niche market	0.28	0	0.43	0.65	0
Farmers and local agriculture benefits					
Label enables choice for the farmer	1.14	6.41	0	0.65	0.83
Label will help state agriculture	0.85	0	1.30	0	1.24
Label will help farmers that grow conventional crops non-GMO	0.28	0	0.43	0	0.41
Label will help farmer give what the consumer wants	0.28	0	0.43	0	0.41
Rationale for opposition to GMOs and need for label					
Other countries label, why can't we?					
64 other countries have done it, why haven't we?	18.07	10.26	19.13	6.54	26.86
Lack of Scientific Evidence					
Unknown consequences with GMOs	7.25	14.10	4.78	5.23	8.68
Not enough science on GMOs	6.97	12.82	4.35	3.92	9.50
Lack of independent studies	6.83	7.69	4.78	2.61	11.16
No long-term studies	5.97	7.69	4.35	0	10.74
Need to test GMOs for safety	3.56	6.41	2.17	1.31	5.37
Cites uncertainty in scientific community on GMOs	3.13	5.13	3.48	1.96	2.89

Scientists have been silenced	2.42	1.28	2.17	0	4.55
Government is currently inefficient/distrustful					
Lack of FDA oversight on GMO regulation	4.69	0	1.30	2.61	10.74
Lack of overall government oversight	4.28	10.26	1.74	3.27	5.37
Government is corrupted	4.13	1.28	3.91	3.92	5.37
Government was wrong before about safety (DDT)	2.84	1.28	1.74	5.23	2.89
Lack of EPA oversight on GMO regulation	0.71	0	0	1.31	1.24
Lack of USDA oversight on GMO regulation	0.71	0	0.43	1.31	0.83
Solutions					
Support alternative agriculture					
Benefits of organic, agro-ecological farming	12.66	15.38	12.61	20.26	7.02
Benefits of local agriculture	3.27	6.41	1.74	1.96	4.55
We need to stop monoculture farming practices	1.56	0	2.17	1.31	1.65
Need sustainable agriculture for the future, not GMOs	1.14	1.28	1.74	0	1.24
We need to focus on food security	0.14	0	0	0	0.41
States can lead to federal change					
Calls on state to be a leader	8.25	19.23	1.30	11.76	9.09
No federal action so we need state action	2.70	6.41	1.30	0	4.55
Follow other states who have passed a labeling law	2.23	0	6.52	0.65	0
State bills will produce a federal bill	1.56	6.41	1.74	0	0.83
Reference bottle bill leadership	0.28	2.56	0	0	0
Ban the cultivation of GMOs					
GMOs should be banned/implement a moratorium	3.27	2.56	3.04	2.61	4.13
Stronger government oversight					
Support for the precautionary principle	1.56	0	1.30	1.96	2.07
Calls for more FDA oversight in GMO regulation	0.28	0	0.43	0	0.41
Calls for more government oversight	0.28	0	0.43	0	0.41
Government meant to oversee corporations	0.28	0	0	0	0.83
Voluntary labeling is not enough	0.28	0	0.43	0	0.41
A company should not determine labeling policy	0.14	0	0	0	0.41
Opposition for a GMO label and general support of GMOs					
Benefits of GMOs					
Environmental benefits of GMOs					
GMOs are a solution to environmental problems	1.14	0	0.87	0	2.48
GMOs reduce pesticides	0.71	0	0	0	2.07
GMOs result in higher land productivity	0.14	0	0	0	0.41
Humanitarian benefits of GMOs					
GMO solution to humanitarian issues – "Feed the world"	1.0	1.28	0	0	2.48
GMOs can solve so many future problems	0.28	1.28	0	0	0.41

GMOs help countries gain self-sufficiency	0.14	0	0	0	0.41
Economic benefits of GMOs					
GMOs lower the cost of food	0.85	0	0	0	2.48
Sustainability benefits of GMOs					
GMOs are an example of sustainable agriculture	0.71	1.28	0.43	0	1.24
Farmer benefits of GMOs					
GMOs help farmers out economically	0.43	0	0.43	0	0.83
Health benefits of GMOs					
GMOs can help solve health problems in the future	0.28	0	0	0	0.83
Perspective on GMO Labels					
Consumer rights					
Organic label tells you if a food is GMO – GMO label unnecessary	2.85	6.41	2.17	0	4.13
A GMO label will confuse customers	2.70	5.13	1.74	0	4.55
Consumers can look elsewhere for more information on their food – label not required to find information	0.71	2.56	0.43	0	0.83
A label will reduce consumer choice	0.57	1.28	0.87	0	0.41
A label undermines consumer confidence	0.28	0	0	0	0.83
Economic risks with a label					
More difficult for farmers to sell products state to state	2.28	3.85	1.30	0	4.13
Increases costs for producers and retailers	1.99	3.85	0.87	0	3.72
Will increase the price of food	1.42	3.85	1.30	0	2.89
Costs will be passed on to taxpayers	0.57	0	0	0	1.65
Labeling will hurt future biotechnology research and that state's economy	0.43	0	0	0	1.24
Label is just marketing for the organic industry	0.28	0	0	0	0.83
Citizens will have to pay for a lawsuit if labeling bill passes	0.14	0	0.43	0	0
The state lacks the monetary resources to handle GMO labeling	0.14	0	0	0	0.41
A label should be based on science					
This label would not be based on science	1.85	3.85	1.74	0	2.48
"Consumer want" has not held up in court	1.0	2.56	0.43	0	1.65
Need uniformity in labeling					
There needs to be a federal before state	1.0	3.85	0.43	0	1.24
A label will hurt future biotechnology innovation					
Government does not want to stifle biotech research	0.43	0	0.43	0	0.83
Those against GMOs will turn back technology	0.28	2.56	0	0	0
A label will discourage investment in the biotech field	0.14	0	0	0	0.41
A label will hurt farmers					
A label unfairly targets modern agriculture	0.28	1.28	0	0	0.41

Too hard for farmers to segregate GMO from non-GMO	0.28	0	0	0	0.83
No choice for famers with GMO labels	0.14	0	0	0	0.41
Increased corporate concentration/favor large businesses					
A label will increase corporate concentration	0.14	0	0.43	0	0
Rationale for support of GMOs and opposition to labels					
Scientific evidence					
There is no scientific evidence that says GMOs have negative effects	2.99	7.69	2.17	0	4.13
Scientists have more control over genetic engineering than conventional breeding	0.14	0	0	0	0.41
Misinformation/Deception about GMOs from opponents					
GMOs are not directly linked to corporate agriculture	0.14	0	0.43	0	0
Solutions					
No change needed					
FDA already regulates GMOs	2.13	6.41	0.87	0	3.31
Voluntary labeling already exists	1.85	2.56	1.74	0	2.89
Voluntary labeling works well	1.14	3.85	0	0	2.07

Curriculum Vitae

Sara Velardi

702 Schuyler Street, Syracuse, NY 13204
203-583-0181
Email: shvelard@syr.edu

EDUCATION

State University of New York College of Environmental Science and Forestry, Syracuse, NY

Expected: May 2018
Ph.D. Candidate in Environmental Science and Natural Resource Policy, ABD
Candidacy Exam completed: May 2016
Dissertation: *A Call for Transparency in the Food System: The Role of Private Actors in the State and Federal Genetically Modified Organism (GMO) Labeling Initiatives in the United States*
Advisor: Dr. Theresa Selfa
Committee Members: Dr. Rick Welsh and Dr. Carmen Bain

State University of New York College of Environmental Science and Forestry, Syracuse, NY, 2014

M.S. in Environmental Forest Biology
Thesis: *An Exploration into the Components of Effective Professional Development for Science Educators: A Case Study with the Environmental Education Program Project Learning Tree®*
Advisor: Dr. Beth Folta
Committee Members: Dr. Diane Kuehn and Dr. Laura Rickard

Skidmore College, Saratoga Springs, NY, 2012

Environmental Science Major, Anthropology Minor
Advisor: Dr. Joshua Ness

TEACHING EXPERIENCE

Instructor of Record

Ecology, Summer 2017

Onondaga Community College

- Designed and taught introductory ecology undergraduate lecture and lab course including field classes

Exploring Biology, Fall 2015, Spring 2016

Onondaga Community College

- Taught introductory biology lecture and lab for non-majors covering topics from molecular biology to environmental biology

Teaching Assistant

Intro to Geospatial Information Technology, Spring 2018
SUNY College of Environmental Science and Forestry
Will teach two lab sections on usage and interpretation of ArcGIS software

Intro to American Government, Fall 2017
SUNY College of Environmental Science and Forestry
Led class lectures, facilitated classroom discussions, edited and graded papers and exams

Community Planning and Sustainability, Spring 2015
SUNY College of Environmental Science and Forestry
Assisted in teaching, editing and grading students' semester papers, facilitating classroom discussions and guest lectures

Non-Personal Interpretation Methods and Design, Spring 2014
SUNY College of Environmental Science and Forestry
Assisted in teaching, instructed how to create brochures through Microsoft Publisher, podcasts through iMovie and graded writing assignments and design projects.

Comparative Vertebrate Anatomy, Spring 2014
SUNY College of Environmental Science and Forestry
Assisted in grading and instruction for lectures

Personal Interpretation in Environmental and Forest Biology, Fall 2013
SUNY College of Environmental Science and Forestry
Led recitation, conducted field trips, edited and assessed writing of students' lesson plans and individual service plans

Organismal Biology and Ecology Laboratory, Fall 2012; Cell Biology and Genetics Laboratory, Spring 2013
SUNY College of Environmental Science and Forestry
Taught two labs per semester including set-up, lecture, instruction, led field trips, graded lab reports, exams and weekly labs for over 40 undergraduates.

RESEARCH EXPERIENCE

Graduate Research Assistant, 2015
Co-Principal Investigators: Dr. Stephen Shaw and Dr. Theresa Selfa, SUNY College of Environmental Science and Forestry
USDA AFRI Water for Agriculture Seed Grant: *Lake Ontario Basin in Coming Decades: Room for Expansion or Imminent Future Water Conflicts*
Utilized satellite mapping to identify irrigation sites for farmers along the Lake Ontario Basin creating maps through ArcGIS; designed survey questionnaires for farmer irrigation and water use

Graduate Research Assistant, 2013-2014

Co-Principal Investigators: Dr. Beth Folta, SUNY College of Environmental Science and Forestry and Tom Shimalla, New York State Department of Environmental Conservation (DEC)

Project Learning Tree Model Program Initiative Grant for Professional Development Improvement

Designed surveys and conducted phone interviews to assess effectiveness of professional development programs of the DEC's Project Learning Tree environmental education curriculum program

Undergraduate Research Assistant, 2010

Principle Investigator: Dr. Joshua Ness, Skidmore College

Collected spring ephemeral distribution data along walking/hiking trails at Merck Forest, Vermont

PUBLICATIONS

Published Manuscripts

Bain, C., Selfa, T., Dandachi, T., and **Velardi, S.** (2017). 'Superweeds' or 'survivors'? Framing the problem of glyphosate resistant weeds and genetically engineered crops, *Journal of Rural Studies*, *51,* 211-221.

Velardi, S., Folta, B., Rickard, L, and Kuehn, D. (2015). Components of effective professional development for science educators: A case study with Project Learning Tree. *Applied Environmental Education & Communication, 14*(4), 223-231.

Manuscripts in Progress

Velardi, S. and Selfa, T. Framing the food system: A content analysis of congressional hearings surrounding the regulation of genetically modified organisms (GMOs) in the food system (2011-2016). *Rural Sociology.*

Velardi, S. and Selfa, T. Local frames, local success: Case studies of genetically modified organisms (GMO) labeling initiatives in the northeast, US. *Agriculture and Human Values.*

Velardi, S. and Selta, T. Understanding policy change with the advocacy coalition framework: An application to state genetically modified organism (GMO) labeling policy. *Policy Studies Journal.*

Other Publications

Velardi, S. Finding the Green Lining: The Restoration of a Hazardous Waste Site Planting One Tree at a Time. New York State Outdoor Education Association (NYSOEA). *Pathways*, Spring 2013.

NATIONAL PRESENTATIONS

Velardi, S. and Selfa. T. Governance and Genetically Modified Organisms (GMOs): A content analysis of congressional hearings surrounding the regulation of biotechnology in the food system (2011-2016). Presented at Agriculture, Food, and Human Values Society Annual Meeting and Conference at Occidental College in Los Angeles, CA, 2017.

Velardi, S. and Selfa, T. A Call for Transparency in the Food System: Case Studies of Genetically Modified Organisms (GMO) Labeling Initiatives in the Northeast, US. Presented at the XIV World Congress of Rural Sociology at Ryerson University, Toronto, Canada, 2016.

Velardi, S. A Call for Transparency in the Food System: Case Studies of Genetically Modified Organism (GMO) Labeling Initiatives in the Northeast, US. Presented at the 2016 Biotechnology Symposium at SUNY-ESF, 2016

Velardi, S. What Constitutes Effective Professional Development: A Case Study with Project Learning Tree. Presented at North American Association of Environmental Education (NAAEE) Conference in Ottawa, Canada, 2014.

Velardi, S. New York Evaluation Results: How Project Learning Tree is Used in New York State. Presented at Project Learning Tree Conference in Traverse City, Michigan, 2014.

GRANTS AND FELLOWSHIPS

Invited for second round submission for the National Science Foundation Sociology Doctoral Dissertation Improvement Grant, 2017, Co-PI, *A Call for Transparency in the Food System: Case Studies of State and Federal Genetically Modified Organism (GMO) Labeling Initiatives in the United States.*
Graduate Student Association Travel Grant, 2017, 2016 (SUNY-ESF)
Office of Instruction and Graduate Studies Travel Grant, 2017, 2016, 2014 (SUNY-ESF)
Awarded scholarship to participate in Graduate Student Workshop on Socio-Environmental Synthesis: Interdisciplinary Proposal Writing and Collaboration hosted by National Socio-Environmental Synthesis Center, 2016, (SESYNC)
Alumni Association Memorial Scholarship, 2016 (SUNY-ESF)
Awarded scholarship to attend ComSciCon Conference hosted by Cornell University on science communication and public outreach, 2015 (Cornell University)
Fink Career Fellowship, 2014 (SUNY-ESF)
Maple Leaf Service Award, 2013 (SUNY-ESF)

INVITED TALKS AND OUTREACH

Technology Alliance for Central New York Scientifique Junior Café, Museum of Science and Technology, Syracuse, NY, 2017
So Much to Know about GMOs, Our Friend or Our Foe? Analyzing the Controversial Genetically Modified Organism

Central Square Middle School STEM Guest Lecture, Central Square, NY, 2017
So Much to Know about GMOs, Our Friend or Our Foe? Analyzing the Controversial Genetically Modified Organism

Collaborator with ESF in the High School Outreach Program 2013-Present
Give guest lectures to visiting high school students on doctoral and masters research

STEM Middle School Mentor, 2014
National Academy of Sciences STEM Mentoring Program for Syracuse City School District

PROFESSIONAL SERVICE

Journal Reviewer
Renewable Agriculture and Food Systems
Applied Environmental Education & Communication

University Service
Member, Search Committee for Assistant Professor in Environmental Studies, SUNY-ESF, 2017

RELATED WORK EXPERIENCE

Science Coordinator for Father Champlin's Guardian Angel Society 2017, 2016
Planned science curriculum for summer school program, grades 5-9
Taught interactive project-based science lessons to population of refugees or families of refugees in Syracuse, NY

Graduate Ambassador for Office of Instruction and Graduate Studies 2015-2017
Advised and mentored graduate students on degree requirements, candidacy exam and defense preparation, and edited theses prior to graduation
Planned, organized and implemented the Graduate Student Orientation for fall and spring orientation
Led campus tours to prospective graduate students

Freelance Writer, Core Informatics 2015-2016
Wrote monthly articles for data management software company related to food safety and food safety

Naturalist at Beaver Lake Nature Center in Baldwinsville, New York 2013-2015
Led and created environmental education programs for visitors of all ages

Graduate Student Leader of SUNY-ESF Science Corp Summer Program 2014, 2013
Developed and taught science curricula for summer programs grades 5-12
Led team of 4 undergraduates in organizing, planning and administering program activities

Graduate Teaching Fellow for SUNY-ESF Colloquium on Teaching and Learning 2013-2017

Developed, led and implemented two all-day programs on effective teaching strategies for incoming graduate teaching assistants

ADDITIONAL WORK EXPERIENCE

Indoor Cycling Instructor, Syracuse University Recreation Services, 2017

Schwinn Indoor Cycling Certified

Board Operator, WMNR Public Radio 2009-2012

Broadcasted prerecorded and live radio programs including Tanglewood and Live from Vienna

PROFESSIONAL AFFILIATIONS

Rural Sociology Society
Agriculture, Food, and Human Values Society

REFERENCES

Theresa Selfa, Ph.D.
SUNY-ESF
Department of Environmental Studies
219 Marshall Hall
1 Forestry Drive
Syracuse, NY 13210
Phone: 315-470-6570
Email: tselfa@esf.edu

Rick Welsh, Ph.D.
Syracuse University
Department of Public Health, Food Studies and Nutrition
542 White Hall
Syracuse, NY 13244
Phone: 315-443-4060
Email: jrwelsh@syr.edu

Larry Weiskirch, Ph.D.
SUNY Onondaga Community College
Department of Biology
Ferrante 250
4585 West Seneca Turnpike
Syracuse, NY 13215
Phone: 315-498-2418
Email: weiskirl@sunyocc.edu